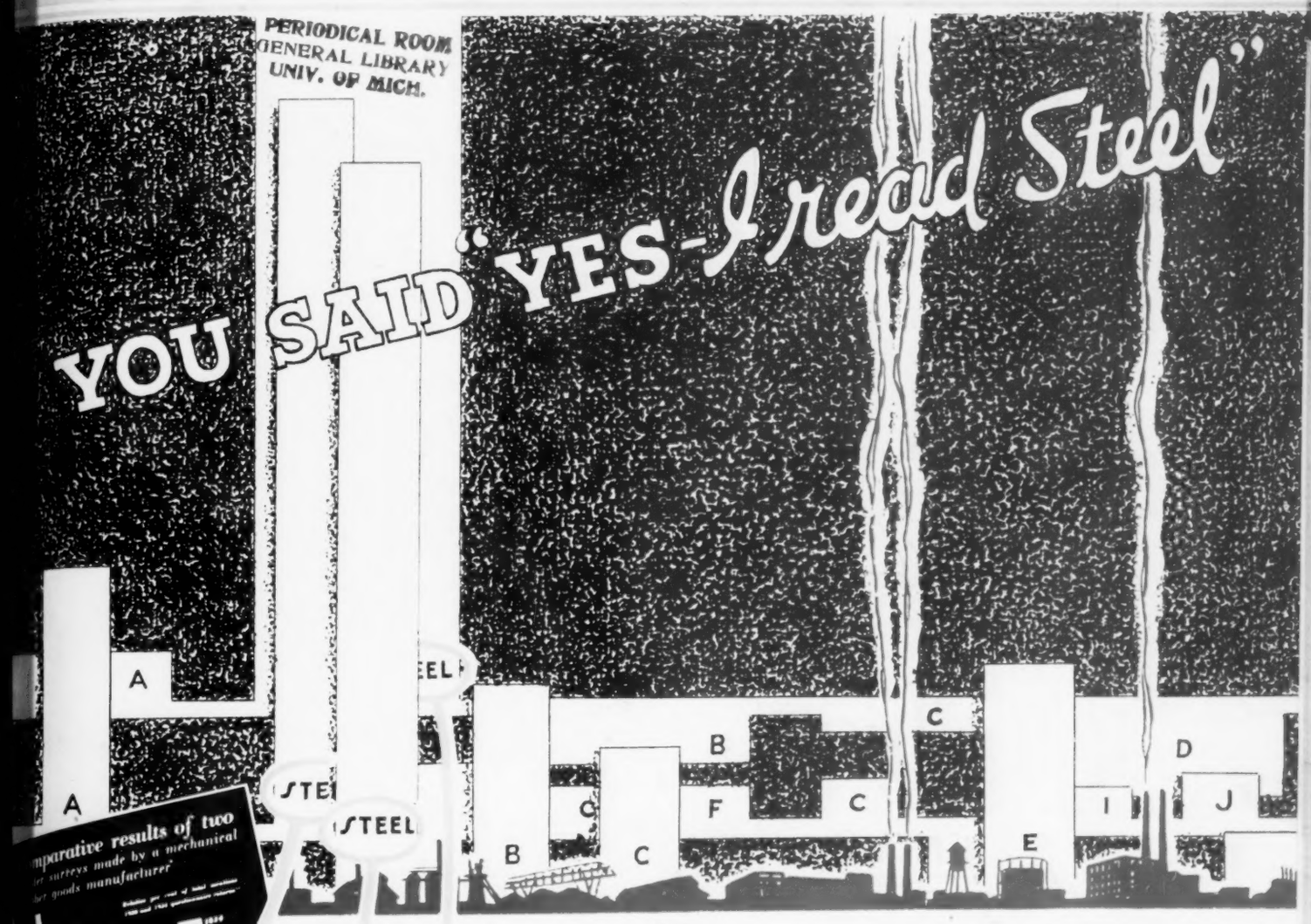
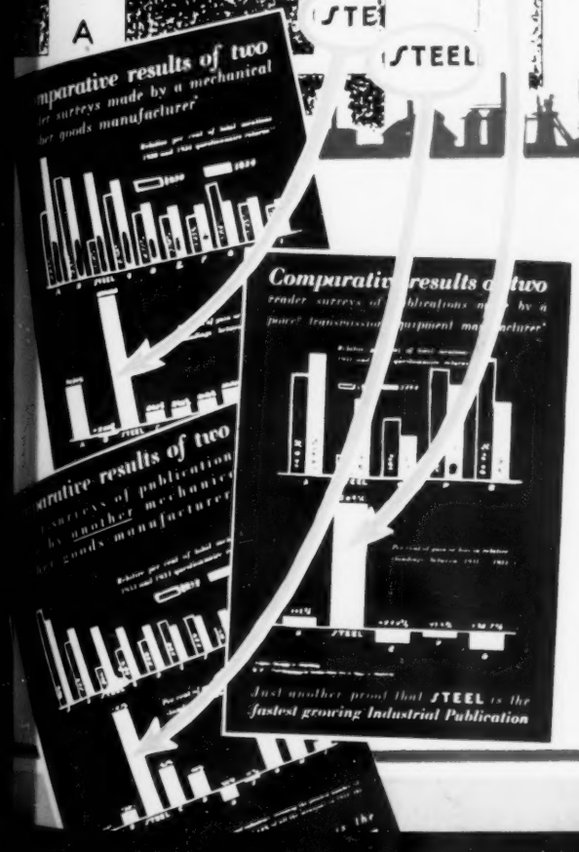
July 1, 1935
JUL 1 - 1935

STEEL

PRODUCTION • PROCESSING • DISTRIBUTION • USE

FOR FORTY-EIGHT YEARS—IRON TRADE REVIEW

PERIODICAL ROOM
GENERAL LIBRARY
UNIV. OF MICH.



Comparative results of two
Comparative results of two
Just another proof that STEEL is the fastest growing Industrial Publication

You, our vast army of readers, have gone on record to prove the statement that STEEL is the

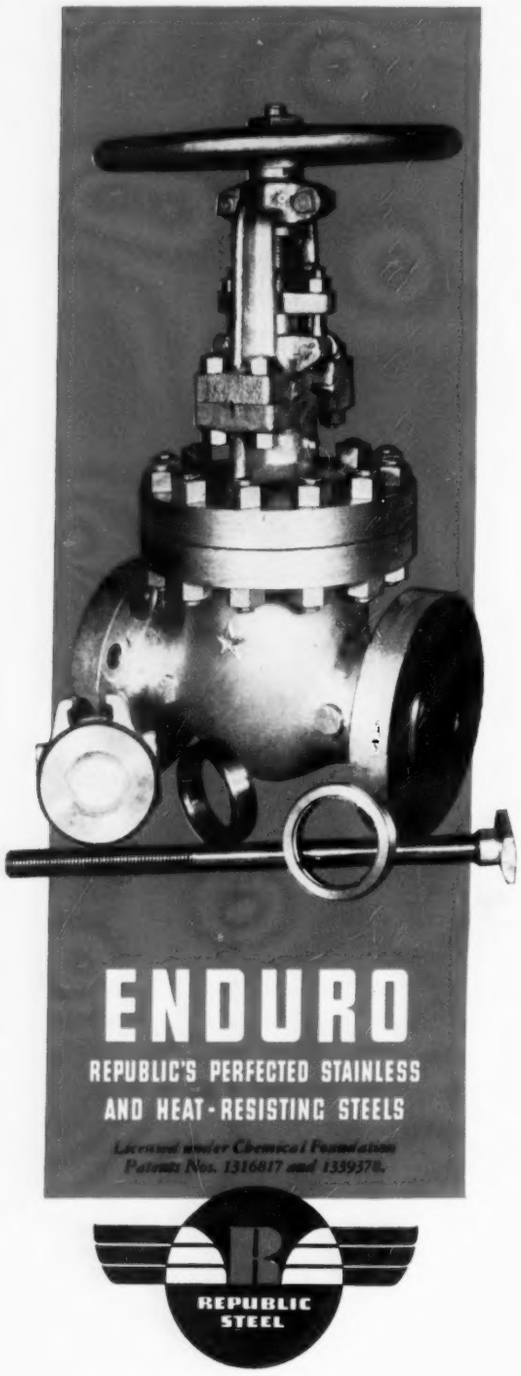
Fastest Growing Industrial Publication

We thank you!

Today is our Fifth Anniversary as STEEL (for 48 years—Iron Trade Review)—a good time to pledge continued effort to make STEEL even more comprehensive, penetrating and vital.

The composite chart in the background depicts the growth of STEEL. This presents graphically the results of a series of reader surveys made by manufacturers selling to the iron, steel and metalworking industries. The tall columns (top left) show in each case the remarkable growth of STEEL'S readership compared with other publications.

Wearing Parts of REPUBLIC ENDURO *last longer*



Vital parts of many types of industrial equipment can be made more durable by the use of Republic ENDURO Stainless and Heat-Resisting Steels. And the great number of types of ENDURO enables the user to select just the right grade for each specific application.

In the valve illustrated, the stem is made of ENDURO FC. In this grade the analysis is controlled to give free-machining qualities without sacrifice of corrosion-resistance. The wearing parts—the seat, disc and ring—call for an entirely different type, ENDURO S-1. In this grade carbon is kept to .12% maximum and the chromium within the 11½ to 14% range. This provides a metal that can be heated and quenched to a Brinell hardness of 350 without affecting its corrosion-resistance—a metal that will withstand abrasion and impact, and is ideal for wearing parts operating under conditions involving corrosion and high temperatures.

Republic metallurgists will gladly assist you in selecting the correct type of ENDURO Stainless and Heat-Resisting Steels for any class of service.

Republic Steel
CORPORATION
GENERAL OFFICES · · · YOUNGSTOWN, OHIO
CENTRAL ALLOY DIVISION · · MASSILLON, OHIO

Vol. 97, No. 1, July 1, 1935, issue of STEEL, published weekly at Cleveland, O. Entered as second class matter at the postoffice, Cleveland, O., under the act of March 3, 1879. Subscription price U. S. one year, $4.00; two years, $6.00; single copy (current issues) 25c; Canada, one year, $6.60; two years, $11.20. Great Britain and other foreign countries, one year £2

STEEL

PRODUCTION • PROCESSING • DISTRIBUTION • USE

For forty-eight years—IRON TRADE REVIEW

EDITORIAL STAFF

E. L. SHANER, *Editor*
E. C. BARRINGER, *Managing Editor*
E. C. KREUTZBERG, *Engineering Editor*

ASSOCIATE EDITORS

A. J. HAIN, E. F. ROSS, G. H. MANLOVE, J. D. KNOX, A. H. ALLEN

New York B. K. PRICE—L. E. BROWNE
Pittsburgh . . . E. A. FRANCE JR.
Chicago . . . . . W. G. GUDE
Washington . . . . . L. M. LAMM
London . . . . VINCENT DELPORT

Published by
PENTON PUBLISHING CO.
PENTON BUILDING
CLEVELAND, O.

JOHN A. PENTON . *Chairman of Board*
C. J. STARK . *President and Treasurer*
J. D. PEASE . *Executive Vice President*
F. V. COLE . *Vice President and Secretary*
GEORGE O. HAYS . . *Vice President*
E. L. SHANER . . . *Vice President*

BUSINESS STAFF

GEORGE O. HAYS, *Business Manager*
JOHN HENRY, *Advertising Manager*
R. T. MASON, *Circulation Manager*

New York . . E. W. KREUTZBERG, J. F. AHRENS, J. W. HOWE
Pittsburgh . . . . S. H. JASPER
Chicago . . . . . L. C. PELOTT
Cleveland . . . . R. C. JAENKE

Contents . . July 1, 1935

Volume 97 ◆ Number 1

AS THE EDITOR VIEWS THE NEWS 13

Shun Codes, MAPI Urges Members 14
Survey Shows Mechanization Aids Employment 15
Plate Association Votes to Carry On 15
Freight Rates on Foundry Sand Cut 16

Production 16
Meetings 16
Steel in the News 16
Dismantled 17
Financial 17
Users', Makers' Activities 26
Labor 80

Government's Steel Purchases Heavy 17
Mirrors of Motordom 18
Windows of Washington 20
Industrial Men in the Day's News 22
Record of 1934 Steel Ingot and Castings Output 24
Obituaries 26
EDITORIAL—Urge for Efficiency Sign of Progress 27
THE BUSINESS TREND 28

ENGINEERING DEVELOPMENTS:

Automobile Gears 30
New Steel for Truck Body 33
Roller Bearings 34
Methods and Materials 36
Insulating Pipes 36
Clay Testing Furnace 37
Robert E. Kinkead 39
Open-Hearth Design—V 40
To Buy or Not To Buy?—V 48
Progress in Steelmaking 51
Report of A.S.T.M. Meeting .. 52
New Equipment 55

MARKET REPORTS AND PRICES 61-81

CONSTRUCTION AND ENTERPRISE 81

ADVERTISERS' INDEX 98

BRANCH OFFICES:

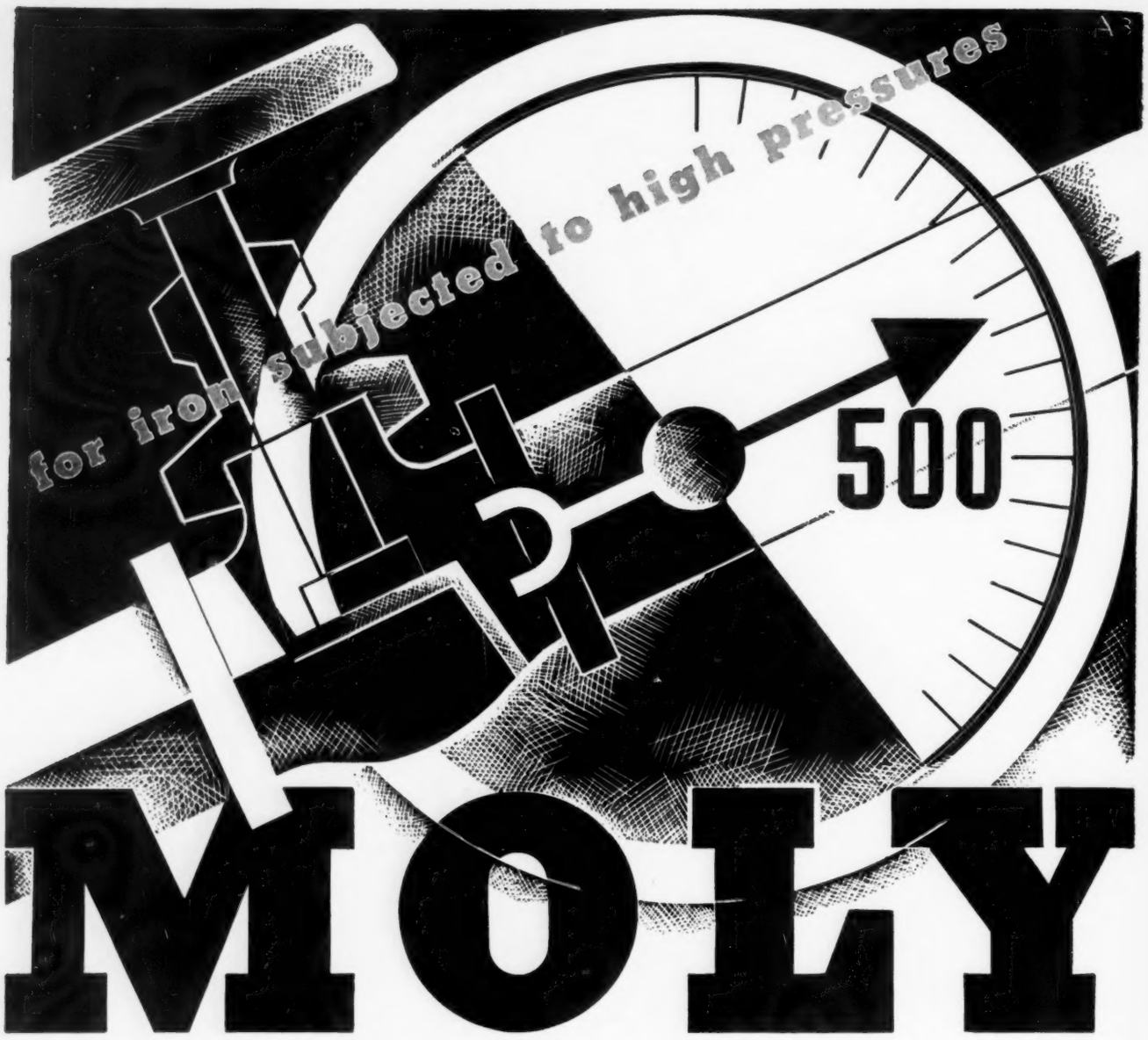
New York . . . . . 220 Broadway
Chicago . . . . Peoples Gas Building
Pittsburgh . . . 1650 Koppers Building
San Francisco . . . . 2413 Milvia St. Berkeley, Calif., Tel. Berkeley 7354W
Washington . . . National Press Building
Cincinnati . . . 418-420 Sinton Hotel
London . . . . . Caxton House Westminster, S. W. 1
Berlin . . Berlin, N. W. 40, Roonstrasse 10

Member Audit Bureau of Circulations; Associated Business Papers Inc., and National Publishers Association.

Published every Monday. Subscription in the United States, Cuba and Mexico, one year $4, two years $6; in Canada, one year $6.60, two years $11.20; in Great Britain and European countries, one year £2.

Entered as second class matter at postoffice at Cleveland under the Act of March 3, 1879.

Copyright 1935 by Penton Publishing Co.



ADVANCING civilization has ever demanded inventions and mechanical improvements to meet its faster economic pace and higher industrial standards. Greater speed — in transportation and in production — has put heavier strains on machinery . . . which in turn, have put higher pressures and other stresses on the irons and steels going into their construction.

For example, more and more is being demanded of such iron castings as Diesel and gasoline engine liners, valves, cylinder blocks, condenser heads, etc. *The most economical and efficient of all methods for meeting the increasingly stringent specifications is by resorting to a Molybdenum-alloyed gray iron.*

Example: A concern producing cast iron steam valves had been using an alloy iron (with no "Moly") which passed the 250 lbs. test against leakage, but almost invariably permitted leaks at 350 lbs. They changed the alloy content to .45% Moly and .25% Chrome — cutting their alloy cost from .62c per pound to .45c per pound — *and the valves did not leak even at 500 lbs. pressure.*

Moly is gaining more and more the reputation as the outstanding alloy element of the age. Keep up to date with the developments that are constantly making progress . . . let us put you on the mailing list of our periodical news sheet, "*The Moly Matrix.*" And, while you are sending us your name and address for this purpose, your further request for these two books will be gladly complied with: "*Molybdenum in* 1934" and "*Molybdenum in Cast Iron* — 1934 *Supplement.*" Still further, if you've an alloy problem that's hard to solve — either from an economy or an efficiency standpoint — our metallurgists and Detroit laboratories are at your disposal. Climax Molybdenum Company, 500 Fifth Avenue, New York City. (In Canada: Railway & Power Engineering Corp., Ltd.)

CLIMAX Mo-lyb-den-um

As the Editor Views the News

THE airing of divergent views on taxation is serving the useful purpose of driving home to the public the sobering thought that the exorbitant cost of reckless experiment must be paid through the nose in taxes. Also, there is significance in the knowledge that the more the subject is discussed and the more the methods of raising revenue are studied, the greater will be the realization that the tax burden must fall heavily upon citizens in every walk of life. The President will fail in his attempt to make the people believe that the big and the rich will pay the piper for the new deal dance.

• • •

Killing Goose To Get Eggs

Apparently the advisers of the Chief Executive are guided by the conviction that the greatest possible emphasis upon the "soak-the-rich" and "share-the-wealth" aspects of the tax problem constitutes good politics. Probably they feel that the necessity of stealing the thunder of Long, Sinclair, Townsend, etc. is ample justification for their shameful attempt to deceive the public. If they "soak" the big and the rich hard enough to actually redistribute wealth in substantial measure, they will destroy some of the nation's most effective facilities (p. 18) for creating wealth. They would kill the goose to get the eggs.

• • •

Burning House To Kill Rats

However, this is quite consistent with new deal policies of the past. The Roosevelt administration time and time again has demonstrated that it believes the best way to rid a house of rats is to burn the house. It started out to rid the nation of dishonest "money changers." It has not halted the dishonest ones, but it has made life miserable for the 99 out of 100 who are honest. It has inaugurated scores of reforms, but while few have been reformed, everybody has been penalized severely by the attempts. The Roosevelt big stick has been wielded vigorously — always to the accompaniment of the inspired articles of the greatest federal propaganda staff in history—yet it has always missed its mark and has fallen upon the heads of innocent bystanders. Yet in spite of repeated failure, reform still is the new deal obsession; recovery is but a sham.

• • •

Recovery a la Old Deal

Now that the government has turned its back upon recovery, natural forces probably will be accentuated. The trend of business (p. 28) shows that industrial activity has been affected only slightly by the confusion attending the end of NIRA and the recent vindictive legislation. Industry again is devoting much attention to economy in production and manufacturing (p. 27), and this is a certain sign of economic progress. Industrial groups, while recognizing certain advantages under the recent codes, may be cautious in entering into new agreements under government auspices. MAPI (p. 14) is counseling its members to withhold action until the legislative situation becomes clarified.

• • •

New Directory Much Improved

Congratulations are due to staff of the American Iron and Steel institute for the many improvements and innovations it has introduced in the 1935 edition of *The Iron and Steelworks Directory* (p. 26), which is just off the press. Binding and typography are excellent. Arrangement of the data under each company heading is far superior to that in past volumes. The supplementary lists in the back of the book, showing producers and their capacities under each product, will appeal strongly to the thousands to whom the directory is a frequently consulted book of reference . . . Members of the American Society for Testing Materials, meeting in Detroit last week (p. 52), heard some statements about design and materials for modern homes which differ from views widely held in the iron, steel and metalworking industries.

E. L. Shaner

Shun Codes, MAPI Urges, Girding for Another Year

AFTER budgeting for another year's activities, the Machinery and Allied Products institute—MAPI—organized two and a half years ago as a federation of trade associations, voted at Cleveland, June 27, against voluntary codes under the skeletonized NRA.

The question came before the annual meeting, attended by several hundred members, as a recommendation from the executive committee "that under the uncertain conditions prevailing as to pending and prospective national legislation, and until such legislative situation becomes clarified, no action be taken by member organizations."

This resolution was adopted unanimously, as was another presented as a recommendation from the committee regarding circular letter No. 100 issued June 7, by the treasury department. The letter proposes that in lieu of code compliance requirements all bids for supplies, materials or construction submitted to the government contain a clause binding on the bidder "any subsequent legislation requiring observance of minimum wages and maximum hours."

See Hazards in Clause

"The inclusion of such a clause in a business contract, embodying requirements with unknown conditions, the hazard of which is impossible to ascertain, is exceedingly unwise," the committee stated. It recommended that the clause, "or any similar provision of contract be specifically excluded."

The meeting focused its attention largely on governmental affairs. Preceding the adoption of the resolutions, Malcolm Muir, president, McGraw-Hill Publishing Co. Inc., New York, was called upon by John W. O'Leary, president of the institute, to report on recent observations in Washington.

"There is nothing to be gained by you going to Washington," Mr. Muir said. "Whatever you do at this juncture will be held as a club over you. The best intentions may be misunderstood. A great spy system is being built up.

"There is pressure to amend NRA from labor, and also from some business organizations. The latter seem anxious to go ahead and conduct their affairs as in the past two years. One group wants to police its own industry, the other would broaden the authority of the federal trade commission.

"While this is going on it would be foolish for you to put yourselves on record down there.

"Roosevelt's recent declarations have clarified the situation somewhat, because he has put himself, where we long knew him to be—way over to the left.

"Today he is receiving reams of complaints against supposed violations of codes. Jim O'Neill (temporary NRA administrator), who is really a big man, is setting up a committee to handle these complaints. Some of them may look serious, but when sifted out it may be found that they relate only to a small minority.

John W. O'Leary

"The biggest thing before business now is to prove its capacity for business statesmanship. One of the most important points is to cultivate and maintain favorable employe relationship. It would be unwise to declare you are going to hold to code wages and hours, because even if you then were to propose to give more work to your men, to enable them to earn more money, you would be criticized as a code violator.

"Business men must become better politicians. You can't sit back in times like these, and say that you have a Supreme Court, and the court will protect you. You must take more interest in your government."

George H. Houston, president, Baldwin Locomotive Works, was scheduled to give an address on "Legislative Trends," but was unable to attend. Instead, however, he sent a telegram in which he stated that the need for MAPI has just begun, and that at no time was the need for unity and co-operation among business men more essential than today. The "implications" in legislation at Washington, he said, "are the most important," tending to denote a change in our form of government from capitalism to collectivism.

Mr. O'Leary spoke briefly on "Wages, Hours and Working Conditions," and George T. Buckingham, MAPI counsel, on "Legal Problems Confronting the Machinery Industry."

At the luncheon meeting, K. H. Condit, editor, *American Machinist*, and Alexander M. Hamilton, vice president, American Locomotive Co., spoke on the foreign trade outlook. Both recently made trips to Europe. Mr. Hamilton declared that Russia's rise to second position as a gold producing country will be an important factor in trade with that country as she will not require the long-term credit formerly necessary as a basis for her purchases. Mr. Condit found Germany doing fairly well in the heavy industries, and German wages almost comparable with those in this country.

Surveys Machinery Buying

Charles J. Stilwell, vice president, Warner & Swasey Co., Cleveland, in speaking on the subject, "Buying in the Machinery Industries," said that April, May and June will be marked as the period in which real buying began.

A committee report urged the training of apprentices as a safeguard against a shortage of skilled machine operators. Another announced that MAPI hereafter will compile trade statistics.

John W. O'Leary, who is chairman, Arthur J. O'Leary & Sons Co., Chicago, was re-elected president, and the other officers also were re-elected, except that N. W. Pickering, president, Farrel-Birmingham Co. Inc., Ansonia, Conn., was elected vice president to succeed H. C. Beaver.

Mr. Beaver, who is president, Worthington Pump & Machinery Corp., Harrison, N. J., was elected a member of the executive committee. Others elected to fill the four vacancies on the committee are: Charles E. Brinley, president, American Pulley Co., Philadelphia; Phillips Dennett, South Walpole, Mass.; D. F. O'Brien, president, A. P. Smith Mfg. Co., East Orange, N. J., and George P. Torrence, president, Link-Belt Co., Chicago.

Survey Throws Light on Mechanization; Increases Output, Aids Employment

A CHALLENGE to the machine producing industries to develop the machine still further in order to bring about a greater and more uniform use of mechanical devices as a means of increasing the output per worker employed by industry and consequent broadening of the distribution of products and increase in employment is indicated in a study by the National Industrial Conference board for the National Machine Tool Builders association.

This study, one of a series being made for the tool builders' association, reveals mechanization in industry is not as widespread as many people are prone to believe. The growth of mechanization among manufacturing industries since the turn of the century is shown in the accompanying table.

Mechanization of Manufacturing Industries, 1899-1929

	Number of establishments[1]	Average number of wage earners	Total horsepower installed	Total horsepower per establishment	Total horsepower per wage earner
1899	207,514	4,712,763	9,960,980	48	2.11
1904	145,033	5,362,030	13,296,394	92	2.48
1909	175,142	6,472,616	18,551,737	106	2.87
1914	177,110	6,896,190	22,290,899	126	3.23
1919	214,383	9,000,059	29,327,669	137	3.26
1923	196,309	8,778,156	33,094,228	169	3.77
1925[2]	187,390	8,384,261	35,772,628	191	4.27
1927[3]	191,866	8,349,755	38,825,681	202	4.65
1929	210,959	8,838,743	42,931,061	204	4.86

[1] Includes establishments reporting products valued at $500 or more.

[2] Coffee and spice, roasting and grinding, not canvassed.

[3] Poultry killing, dressing and packing, wholesale, not canvassed.

"Although there is considerable fluctuation in the number of factories operating during the 30 years from 1899 to 1929," says the report, "there is no particular long-time movement noticeable. Increased output of the manufacturing of industry was not, therefore, brought about by spreading the work over more plants, but it was the result of an increase in existing establishments.

"This increased capacity was effected by the employment of more labor and capital in the operation of these plants. During the 20 years ending in 1919, the wage earners attached to the manufacturing industries had grown to over 9,000,000 workers, or a little less than twice the number of workers found in these industries in 1899. From 1919 to 1929, despite a 15 per cent increase in population, there was a small shrinkage in the labor force of manufacturers. Nevertheless, there were 42 workers per plant in 1929 as compared with only 23 per plant in 1899.

Steady Trend to Machines

"No check, however, in the movement toward the greater use of machinery is noticeable during the entire 50-year period. This becomes especially clear during the 10 years prior to 1929 when, despite the decrease in the number of wage earners, the greater use of machines produced a total physical output 40 per cent greater than in 1919.

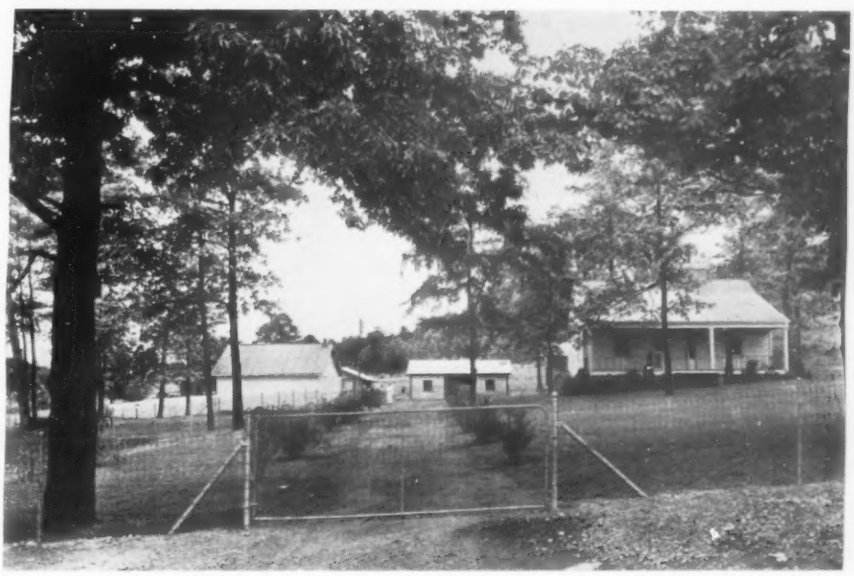
"From this analysis it becomes apparent that mechanization is not as widespread as many people are prone to believe. Of the fourteen industries included in the tabulation, nine have less than 5 horsepower per worker, whereas the remaining five do not average in excess of 9 horsepower per worker. It seems rather encouraging for the future, and a challenge to the machine producing industries further to develop the machine in order to bring about a greater and more uniform use of mechanical devices as a means of increasing the output per worker employed by industry, with the ultimate result of increasing employment and broadening the distribution of wealth."

Plate Association Votes to Carry On

STEEL Plate Fabricators' association has resumed direction of the affairs conducted until recently by the code authority of the steel plate fabricating industry. The latter was dissolved at a meeting held in Chicago, June 11, at which time resolutions were passed by both the code authority and the association requesting members of the industry to make no changes in hours, wages and trade practices as established by the code.

The association was made trustee of the code authority cash balance on hand and as soon as all obligations are met, this money will be distributed on a pro rata basis to the various companies. A commercial committee has been appointed by the association to work out plans for cost estimating in the industry.

The Old Folks at Home—in Steel



This peaceful scene is the Tennesteel Homestead on the crest of Red Mountain overlooking Birmingham, Ala., where the Tennessee Coal, Iron & Railroad Co., subsidiary of the United States Steel Corp., has erected a model homestead development. The modern cottage, barn, poultry house, corn crib and double garage, all are steel-clad. The fence and posts also were fabricated at the nearby Fairfield works of the Tennessee company. All of the steel required for the homestead originated in iron ore removed from the mountain below the four-acre site, to be cultivated with the use of slag from Tennessee blast furnaces as plant food

Freight Rates on Foundry Sand Cut

FRUITS of a 5-year fight, led by some of the larger sellers of foundry sand, were realized with the inauguration July 1 of materially-reduced freight rates on industrial sands.

For a long time there had been a heavy premium on shipment of these sands compared with construction sands, a premium that sellers of foundry sands felt was unwarranted.

A decision finally was handed down last October by the interstate commerce commission approving lower freight rates on industrial sands in official classification territory, the new rates to become effective July 1, 1935.

Foundries getting their sands from eastern points appear to be particularly favored by the decision, it is pointed out—those getting sands from such points as the Albany molding sand district, the Providence core sand district, and the north and south sand shipping sections of New Jersey. Rates on shipments from some of these points are reduced more than one third. While the new rates for industrial sands are not on a parity with those for construction sands, they are almost so.

Typical of the reductions from the Albany district are: To Boston, from $2.90 to $2.25; Hartford, Conn., $2.90 to $2. From Providence: To Boston, from $1.60 to $1.25; to Philadelphia, from $3.70 to $2.95; to Cleveland, from $4.10 to $3.95. On Amboy molding sand: To Hartford, Conn., from $2.90 to $2.25; to Philadelphia, from $1.50 to $1; to Pittsburgh, from $5.60 to $2.70.

Production

STEELMAKING rose 1½ points last week to 37 per cent, due largely to increases in the Chicago, Youngstown, New England and Detroit districts. For this week a drop in the rate is indicated, as some mills are planning to shut down over the holiday. Details follow:

Youngstown—Gained 1 point to 42 per cent last week, but is expected to slide to around 38 per cent at this week's start.

Wheeling — Unchanged for the fourth consecutive week at 48 per cent, with 18 out of 37 open-hearth furnaces active. Owing to the July 4 holiday and shutdowns in most mills beginning with July 3 for the rest of the week, this week's operations will be at approximately 30 per cent.

Pittsburgh—Unchanged at 30 per cent last week. Because most producers here will close down many mill departments from July 3 to July 8, operations this week will barely average 20 per cent. However, by the week following it is expected that sufficient backlogs will have accumulated to permit a sharp rise from this level. According to expectations, ingot operations the week of July 8 should be at close to 35 per cent.

Twenty out of 60 steelworks blast furnaces are now on active schedule, a loss of two from a week ago, National Tube having banked one Monongahela furnace and blown out the second at that works.

Steelmaking Operations

Percentage of Open Hearth Ingot Capacity Engaged in 10 Leading Districts

	Week ended June 29	Change	Same week 1934	Same week 1933
Pittsburgh	30	None	40	46
Chicago	41	+ 2	51	53
Eastern Pa.....	29	None	36	39½
Youngstown...	42	+ 1	44	60
Wheeling	48	None	62	86
Cleveland	46	— 2	64	82
Buffalo	32	None	24	48
Birmingham..	30	None	55	50
New England	61	+ 5	65	71
Detroit	94	+24	93	38
Average	37	+ 1½	46	54

Chicago—Regained all of the preceding week's loss of 2 points, rising to 41 per cent. Schedules are expected to be steady this week except for the July 4 holiday interruption. Blast furnace operations hold at 14 active steelworks stacks of 36.

New England—Advanced to 61 per cent last week, a gain of 5 points. Due in part to the July 4 holiday the rate this week is expected to decline to 50-55 per cent.

Central eastern seaboard—Held at 29 per cent last week, with indications of a decline this week owing to the July 4 holiday. Some producers are expected to suspend operations beginning with Wednesday night for the remainder of the week.

Detroit—Snapped back to 94 per cent last week, a gain of 24 points, as one producer was again operating eight out of nine, while another interest still scheduled all eight.

Birmingham—Remained at 30 per cent, with little change indicated for the immediate future.

Buffalo—Held at 32 per cent last week, with 12 open hearths in production. Curtailment over the July 4 week end is believed likely, and production after that period is problematical.

Cleveland—Down 2 points to 46 per cent last week. The rate this week will be down to 25 per cent or less, due to the July 4 holiday and light demand for steel. National Tube Co., Lorain, will be down all week. Corrigan, McKinney Steel Co. will suspend open-hearth operations Tuesday, while Otis Steel Co.'s schedule is indefinite.

Steel in the News

PENNSYLVANIA state senate meeting at Harrisburg, June 21, rejected a Democratic proposal to investigate the alleged movement of the steel industry away from Pennsylvania. Commenting, Senator George L. Reed, Republican and one of those rejecting the proposal, said:

"I do not know if there is a concentrated effort on the part of the steel industry to move away from Pennsylvania, but Governor Earle has said he will do everything he can to bring the new deal to Pennsylvania, and that, if anything, will certainly drive all industries out."

STEEL TO OCCUPANCY, 136 DAYS

Rockefeller Center Inc., New York, claims a new record for safe and speedy skyscraper construction in the erection of the 40-story international building and Palazzo d'Italia. Only 136 working days elapsed from setting the first steel in the foundation to occupancy of the building, and during this time 22,750 tons of structural steel was erected, 4,650,000 bricks and 9600 tons of limestone were set.

FARRELL KEEPS CORP. TAXES

Proposal to consolidate Sharon and Farrell, Pa., was defeated June 25 in Farrell by a vote to 259 to 2764. It was generally conceded that the plan to merge the two communities would prove to the advantage of Sharon in view of the tax income derived by Farrell from plants of the United States Steel Corp. Sharon had approved the merger 2006 to 537, but a favorable vote in both cities was necessary to effect.

STEEL SALES ARE WHOLESALE

A decision in the superior court in Indiana makes wholesale transactions in commodities, whether or not for resale, taxable at ¼ of 1 per cent instead of 1 per cent as demand by Indiana gross income tax officials. Steel for Indiana public institutions, including the state highway commission, will now be taxable at the lower rate, but individual firms may have to file suit in order to benefit.

Meetings

STEEL Club of Philadelphia attracted record attendance of 320 members and guests at its annual outing at the Aronimink Golf club, near Philadelphia, June 21. L. M.

Parsons, Bethlehem Steel Co., was chairman of the committee on golf and arrangements. Prize winners included H. L. Beyer, H. Atterholt, F. S. Harshbarger, L. R. Steurer, E. W. Hayman, Arthur Buterbaugh, and William Deal. Arthur L. Meyer, Alan Wood Steel Co., is president of the club.

STOCKER WINS AT GOLF

H. F. Stocker, H. F. Stocker Co., Clark building, Pittsburgh, had the low gross score of 88-22: 66 at the golf outing of the Pittsburgh chapter of the Institute of Scrap Iron and Steel, held at the Nemacolin Country club, Washington, Pa., June 26.

Second low net was Meyer Singer with a score of 75. The low gross prize of the day was awarded to H. D. Stahlnacker, Pittsburgh, with 87, and second low gross to J. Wilkoff, Youngstown, O., with a score of 92.

TRAFFIC CLUB TO GOLF

Traffic Club of Pittsburgh holds a golf outing and dinner at the Pittsburgh Field club, July 11.

Financial

AMERICAN CAR & FOUNDRY CO. reports net loss of $1,968,429 in the year ended April 30, a reduction from the deficit of $3,306,832 in the preceding year.

REPUBLIC SELLS INLAND STOCK

Republic Steel Corp. last week disposed of approximately 30,000 shares of Inland Steel Co., which were purchased originally by Cyrus S. Eaton when he was active in Republic affairs. Republic still retains some Inland stock in its treasury. The sale netted Republic over $1,900,000 and anticipates two small bond maturities.

While the special meeting of stockholders to vote on the proposed Republic-Corrigan, McKinney Steel Co. merger has been postponed until July 18, the meeting will again be adjourned until after the government has decided on its appeal, the deadline for which is Aug. 14.

OPTIONS FOR BUDD COMMON

Stockholders of the Edward G. Budd Mfg. Co., Philadelphia, have approved a plan to give stockholders an option to buy two shares of common for each three now held, at $5, $7 and $9 per share.

DEFEAT NEW PREFERRED

Stockholders of the Link-Belt Co., Chicago, have defeated a proposal to exchange the present 6½ per cent preferred stock for one share of new $3 preferred and $60 in cash.

Government's Steel Purchases Heavy

SINCE the inception of President Roosevelt's public works program, orders have been placed for materials valued at more than $800,000,000 of which $299,000,000 can be traced to iron and steel and their products.

The orders include those issued by the federal government, and by the states and political subdivisions to be financed from public works funds.

The largest item is $111,276,583, for steelworks and rolling mill products, other than steel rails, and including structural and ornamental iron work.

Other iron and steel products:

Foundry and machine shop products	$80,607,185
Wire products	4,333,049
Spring steel	587,917
Sheet metal work	2,237,063
Bolts, nuts, rivets	2,383,359
Cast pipe and fittings	14,514,552
Forgings	3,824,925
Hardware, misc.	3,750,416
Heating, ventilating equipmt.	6,888,155
Nails, spikes	751,248
Rail fastenings	18,013,011
Stoves, other than electric	204,505
Railway switches	549,910
Wrought pipe	694,249
Railway cars	43,349,429

By way of contrast, orders for cement have amounted to $101,884,305; sand and gravel $48,133,886; crushed stone $28,037,683; brick and tile $9,644,135; other paving mixtures and materials $22,693,459.

The bureau of labor in itemizing the principal expenditures estimates that approximately 2,625,000 man-months of direct labor have been or will be created in fabricating the products. No estimate is made of the labor required in producing and assembling the raw or primary materials.

Dismantling

AMERICAN SHEET & TIN PLATE CO. has sold its Wellsville works, Wellsville, O., for dismantling purposes to the United Iron & Metal Co., South Side, Pittsburgh. The works, built in 1873 and comprised of ten hot mills for making black sheets and 16 cold stands, probably will realize between 3500 and 4000 tons of scrap.

FIGHT FOR SCOTTDALE STACK

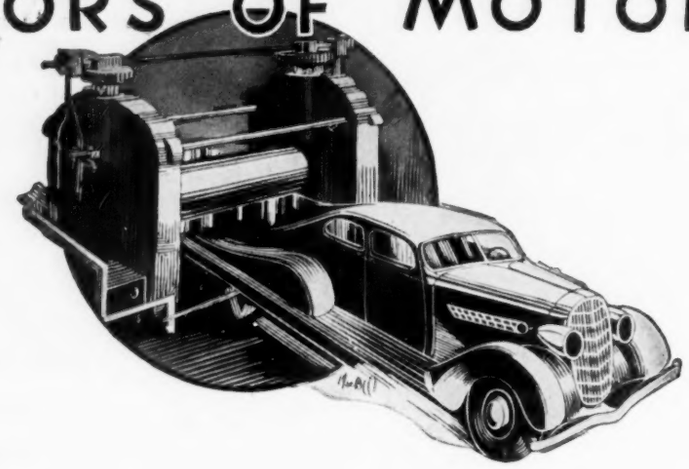
United States Pipe & Foundry Co., Burlington, N. J., recently decided to sell its blast furnace at Scottdale, Pa., for dismantling and awarded the contract to United Iron & Metal Co.

However, residents of Scottdale have sent a delegation to Burlington the past week in an effort to keep the plant intact in the hope that operations there might be resumed.

Armco Marches On Again

George M. Verity, chairman, American Rolling Mill Co., is shown turning the first spadeful of earth for the $3,500,000 enlargement of the East Works at Middletown, O., June 20, using the silver spade that broke ground for the original East Works in 1910. Standing in front of the crowd, left to right, are Charles R. Hook, president; Calvin Verity, vice president; and L. F. Reinartz, works manager. J. B. Tytus, vice president of Armco, and F. H. McGraw, president of the McGraw Construction Co., not shown, made brief talks in addition to Mr. Verity

MIRRORS OF MOTORDOM



DETROIT

ORDINARILY it would be an unpardonable intrusion upon personal privacy to indulge in such speculation, but the threat which President Roosevelt's "soak the rich" and "spread the wealth" tax program offers to the Ford Motor Co. is fraught with great interest—and possibly great danger—to both the steel and the automobile industries.

The position of the Ford company, which this year is the largest single manufacturer of automobiles, is peculiar in that the company is a personal rather than a corporate interest. It is further menaced because presumably both the Ford income and fortune fall into the highest brackets—$10,000,000 and over—on which the proposed income and inheritance rates will purposely be confiscatory.

Since 1919, when Henry and Edsel Ford spent $105,260,000 in purchasing the remaining outside interests, the Ford company is understood to be owned solely by three persons—Mr. and Mrs. Henry Ford and son Edsel. The ratio of ownership of these three has never been disclosed, nor, for obvious reasons, the manner in which the business will be perpetuated.

Assets Over Half Billion

The balance sheet of the Ford company as of Dec. 31, 1934, discloses assets totaling $657,165,560, consisting of $144,958,979 in real estate, $82,811,704 in machinery, equipment, etc., $63,634,223 in inventory, $361,667,154 in cash, etc., and $4,093,500 in deferred charges.

A conservative formula for estimating the net worth of any company is to take the sum of its capital stock and surplus, which in the case of Ford are $17,264,500 and $580,276,391, respectively, or a total of $597,540,891. There is no reference to good will in the balance sheet.

It does not necessarily follow that Henry Ford's personal fortune and the value of the Ford company are synonymous. It is only a guess, but so highly individualistic a person as Henry Ford undoubtedly would retain working control of his company, or 51 per cent, and that between him and Mrs. Ford a two-thirds interest, necessary for many corporate purposes, has been preserved. This, it should be understood, is purely guess work.

In 1926 the estate tax was made 20 per cent, and as revised in 1932 and again in 1934 it was increased to 60 per cent.

It is now proposed, in addition to this estate tax, to levy on inheritances—the new tax to be paid by the beneficiary. On inheritances in excess of $10,000,000 the proposed rate is 75 per cent.

Take an estate of, say, $400,000,000. The estate tax would graduate up to 60 per cent, but so large a part would be at the maximum that this tax probably would be almost $240,000,000.

This would leave about $160,000,000 subject to the new inheritance taxes. It is proposed to graduate these up to 75 per cent, and again on account of size the average rate would be almost the maximum. Thus the inheritance tax would take almost $120,000,000. In so large a tax operation the exemptions would be mere chicken feed.

Thus, out of an estate of $400,000,000 the aggregate federal levy would be close to $360,000,000 or not far from 90 per cent.

And the federal government demands the tax be paid in cash, not in kind. Should a 90 per cent levy face the Ford company's owners, the $361,000,000 it has in cash would pay a 90 per cent impost on $400,000,000.

Quick Assets Imperiled

It is easy to apply the same procedure to the estate of even a small manufacturer and disclose the fact that estate and inheritance taxes would absorb all the quick assets. For all practical purposes, both the estate and the inheritance taxes would be drained from the business.

There is an oblique menace in the intricacy of the inheritance tax situation as regards gifts. Under the present law, any gift made within two years of death is presumed to be in contemplation of it, and the burden of proof otherwise rests upon the estate.

What is peculiarly important in the Ford situation is the fact that the treasury department may go as far back as Sept. 8, 1916, in an attempt to make gifts or transfers without adequate compensation taxable as inheritance.

Now, it happens that late in 1916 a division of thought developed

Automobile Production

Passenger Cars and Trucks—U. S. Only
By Department of Commerce

	1933	1934	1935
Jan.	128,825	155,666	292,817
Feb.	105,447	230,256	335,699
Mar.	115,272	338,434	429,834
Apr.	176,432	352,975	477,746
May	214,411	330,455	364,721
June	249,727	306,477	*340,000
6 Mo.	990,114	1,714,263	*2,240,817
July	229,357	264,933	.....
Aug.	232,855	234,811	.....
Sept.	191,800	170,007	.....
Oct.	134,683	131,991	.....
Nov.	60,683	83,482	.....
Dec.	80,565	153,624	.....
Year	1,920,057	2,753,111	.....

*Estimated.

Estimated by *Cram's Reports*

Week ended:

June 8	87,755
June 15	90,788
June 22	90,586
June 29	89,037

within the Ford company in regard to the policy of plowing back earnings, followed by a suit by the Dodge brothers—John and Horace—to compel Ford profits to be distributed rather than reinvested.

When Henry and Edsel Ford, as a result, considered withdrawing from their original company and starting a new one, the minority stockholders capitulated and in 1919 took a total of $105,260,000 for their interests, leaving the Fords in absolute control. Thus, whatever distribution of stock in the Ford company has been made within the Ford family since 1916 is open to review and might increase the burden on Henry Ford's personal fortune.

Again with the explanation that speculation is permissible only because of the widespread possible consequence to the steel and automobile industries, the potentialities of the treasury department clamping down upon the Ford enterprise for 90 per cent are enormous.

Perhaps the Ford lawyers have the answer, but superficially there appear to be only two means for raising cash—a mortgage loan or the public sale of stock. There is field for vast speculation if such a far-flung enterprise as Ford's should be opened to public investment.

Broad Changes Possible

Whatever new policy was developed in regard to automobile manufacturing and selling might have a conclusive effect upon the remainder of the industry. The entire steel competitive situation in the Detroit area might be altered if the two Ford blast furnaces, the ten open-hearth steel furnaces, and the continuous sheet-strip and the bar mills, having an aggregate annual capacity of about 1,000,000 tons of finished rolled steel, came under new management and perhaps competed in the open market. Or vision what would happen if the Ford heirs suggested that the government take over the company!

A factor of considerable importance is the attitude of Mr. Ford on matters of public policy. He has scorned a retreat with his profit into tax-exempt securities and has been proud to keep it in productive channels. In the matter of paying taxes he has been public spirited. It is, therefore, presumed that any program for perpetuating the Ford company intact would be tempered by an intention to play fair with government and the public, although avoidance of taxes is perfectly legal and to be distinguished from evasion.

The inheritance tax shown on a return must be paid within one year—in cash. An extension of 4 to 8 years is permissible on any additional tax that may be levied, subject to approval by the secretary of the treasury, such deferred payments bearing 6 per cent interest. Since most state inheritance taxes carry a credit up to 80 per cent of the federal tax, they present no additional hazard.

A side issue of no small importance in taxing such an enterprise as the Ford company involves the philosophy of the new deal to promote the interest "of the little fellow" by breaking down control by banking and investment houses.

Were the Ford company to become publicly owned, the presumption is that its control would rest in a relatively small group in which bankers and investment houses naturally would play an important role, and these are interests to which the new deal is opposed.

In regard to income surtaxes, the present maximum rate is 59 per cent on incomes of $1,000,000 and over in addition to the 4 per cent normal rate. It is now proposed, for example, to levy 79 per cent, including the normal tax, on incomes of $5,000,000 to $10,000,000, and 84 per cent on all in excess of $10,000,000.

Blow to Private Enterprise

Any calculation of Ford profits is necessarily sketchy, based upon variations in the profit and loss surplus, but in 1934 this was estimated at $6,860,462, and for 1935 should be considerably higher. The effect of the increased income taxes would be to make Mr. Ford surrender 79 to 84 cents out of every dollar he takes out of the company.

Presumably, also, the Ford company will fall into the highest corporation tax bracket, and be subject to 17½ per cent on its net income.

Unlike some other large fortunes, that of Henry Ford has never been the object of noteworthy criticism. From the humble start in 1903, when Mr. Ford started with $28,000 in cash and held 255 of the original 1000 shares, the history of the company has been one of unexampled solicitude for its labor.

For the government now to propose to exact 79 to 84 per cent of Mr. Ford's personal income, about 17 per cent of his company's net, then suspend over his head a Damoclean demand for 90 per cent of his estate in cash, shows the new deal in the light of hamstringing a friend of "the little fellow" whom it has pressed to its bosom.

Motor Genius May Have Plans

On July 30 Mr. Ford will be 72 years old. According to actuarial computation, he has a life expectancy of exactly 7½ years. Detroit has mixed emotions over the prospect of its principal employer and genius devoting a considerable portion of the twilight of his career to methods for preventing the confiscation of his properties and for perpetuating and safeguarding the continued em-

(*Please turn to Page 79*)

Henry Ford, who is saying good-bye to Jim Rooney as he starts for the San Diego exposition with the 2,000,000th V-8, and Edsel Ford, shown at the right talking with Mayor Clyde Ford of Dearborn, Mich., may shortly literally be on the minimum wage which the new deal boasts as an achievement for labor. The Roosevelt tax program may take 17½ per cent of the Ford Motor Co.'s profits, up to 84 per cent of Henry's and Edsel's incomes, and finally 90 per cent of their estates. Incidentally, the Ford shown is virtually the 23,000,000th built

WINDOWS OF WASHINGTON

WASHINGTON

SEVERAL love feasts were held last week between the new NRA and the federal trade commission. They were enforced, inasmuch as they were requested by the President of the United States.

As the result of these meetings, which are still going on, a number of joint communiques were issued, none of which divulged anything in the way of news but simply reported that progress was being made.

Resulting from these conferences was the appointment of a joint committee, consisting of two men from each body, to go through court and commission decisions to see just what things are unlawful and what can and cannot be done under voluntary agreements and under trade practice conferences.

When this report has been completed it will be printed and widely distributed among interested industries. The report should be available in the next few weeks. If co-operation is agreed upon, additional legislation may be necessary.

Incidently, NRA has not yet definitely decided whether or not it will receive voluntary agreements; that is, the policy on this has not yet been decided. Something definite is expected in the way of a policy announcement almost any time.

Pave Way for Agreements

These love conferences that have been in progress are in an effort to find ways and means of co-operation between the commission and NRA to the end that business seeking to work out voluntary agreements, including labor, wage and hour provisions, and also including fair trade practices, could do so most expeditiously.

It is whispered about that if voluntary agreements finally are permitted they will be submitted to the federal trade commission by the NRA, and that after the commission has completed its scrutiny they will then be turned over to the department of justice.

There is a general belief among those in close touch with the situation that under any such routine a voluntary agreement submitted now would probably be approved about the time the NRA law expires—next April.

Dealing with the matter of voluntary codes, Prentiss L. Coonley, director of the NRA division of business co-operation, says that "at present no definite and final program relative to procedure for and scope of such agreements has been formulated. A thorough study of the scope, significance and usefulness of such agreements is in progress. Pending the determination of policy, we must refrain from actively encouraging industries to submit formal applications for voluntary agreements."

Seek to Avoid Mis-steps

Speaking further on this point, Mr. Coonley said that "NRA must avoid premature action which will necessitate retracing steps to conform to a subsequent revised policy. If a structure of voluntary agreements is to be built up, it must be built solidly and without undue burden of time, energy and cost upon industry. Therefore, NRA must have its own program clearly developed before it can encourage industry to proceed along any definite line."

In the meantime, the new NRA organization is being brought together under definite heads. Under the division of review the following sections have just been set up: Industry studies; trade practice studies; labor studies; code administration studies; NRA organization studies; special studies; imports studies; statistics; records and administrative.

James L. O'Neill, acting administrator of NRA, introduced a new angle last week when he pointed out that the Supreme Court had not declared PRA agreements (entered into voluntarily when code-making was delayed in 1933) unconstitutional. There are rumors of a new drive for PRA agreements, but Mr. O'Neill said there was no decision on this point.

Still another angle is the development that organized labor has put on the President's desk a new NRA bill understood to provide, among other things, for the licensing of corporations.

Among some new dealers the theory has been cherished that by licensing corporations the federal government could put its finger on them and obtain a measure of control over wages and hours, denied by the Schechter decision.

William Green, president of the American Federation of Labor, and Maj. George Berry, assistant to NRA Administrator O'Neil, conferred with the President on the new NRA bill Friday afternoon.

PRESIDENT GETS ANOTHER BAD PRESS FROM TAX PROGRAM

An explanation of the proposed new corporation and other taxes was given at the White House at a press conference last week when it was announced that they were not only for revenue but also for a "better social order."

This statement was made at one of the stormiest press conferences held under the new deal and when the President was obviously disgruntled over the reaction of the newspapers—of all political parties—to his effort to ram the new high revenues through congress in the course of a few days and without adequate hearings.

The President was very much on the defensive and inferentially, at least, blamed the whole thing on Senator Robinson, majority leader of the upper house, for his previous state-

ment to newspapermen, following a night conference at the White House, that the President wanted the new high taxes put on as a rider to the nuisance tax bill.

Action of the President in this instance much resembles the stories which the older Washington correspondents tell of T. R. when he was in the White House.

T. R. would make a flat statement, and then if the reaction of the country was bad he would blame it on the newspapermen and often say that he had never made such a statement.

This led to unending trouble and the resignation of a number of important Washington correspondents, who refused to be the goat even for the President of the United States.

Fred H. Clausen, chairman of the committee on federal finance of the chamber of commerce of the United States, is advocating adequate public hearings before both senate and house committees on the administration's sudden new tax legislation. He insisted that the country should be given an opportunity to examine carefully any revenue measure embodying suggestions for increased and discriminatory taxes.

"We should not rush pell mell," Mr. Clausen said, "into acceptance of hasty or injudicious proposals. Employment for our people and the willingness of individuals to utilize fully their resources and energies to produce recovery can be disastrously affected by an inadequately scrutinized measure that may produce results unforseen by its advocates."

On Friday the house ways and means committee announced that it will not be able to begin hearings before the week of July 8.

Tax schedules at this time are purely tentative, but the corporation brackets most discussed are 10 per cent on net incomes of less than $2000, 11 per cent from $2000 to $5000, 12 per cent from $5000 to $15,000, 13 per cent from $15,000 to $40,000, 14 per cent from $40,000 to $100,000, 15 per cent from $100,000 to $300,000, 16 per cent from $300,000 to $1,000,000, 17 per cent from $1,000,000 to $20,000,000, and 17½ per cent over $20,000,000.

Tentative inheritance tax rates, which are in addition to the estate taxes, start at 40 per cent on net inheritances of $200,000 to $500,000 and range to 75 per cent on more than $10,000,000. (see page 18).

THREE QUIT OBSCURITY OF ROPER'S ADVISORY COUNCIL

Edward L. Ryerson Jr., of Joseph T. Ryerson & Son Inc., Chicago; Harold C. Smith, of the Illinois Tool Co., Chicago; and Howard Hines, Pittsburgh, have resigned from Secretary Roper's business planning and advisory council.

Mr. Roper stated that no reason was given for the resignations except that the members did not have the proper time to devote to this work. However, this was discussed at some length in this department last week.

And in further connection with the business council, an industrial recovery committee has been appointed by the council of which H. I. Harriman, former president of the United States chamber of commerce, is chairman, to make constructive suggestions for the continuance of NRA.

Doubtless when this report is made it will go the way of the other reports of the business council, or many of them—the shortest way to the waste basket—which may be one reason that three of the leading members of the council have resigned. There is talk to this effect in the corridors of the department of commerce building.

BRITISH ALLOW DEDUCTION IN TAXES FOR RATIONALIZATION

The iron and steel and other groups in the capital goods industries should be interested in the attitude of the British government, which has definitely gone on record as encouraging industrial schemes for the elimination of redundant plants, according to unofficial reports reaching the department of commerce.

This attitude is shown in the finance bill for the current year which provides that "where a person pays, wholly and exclusively for the purpose of a trade in respect of which he is chargeable under Case I, of Schedule D (of the income tax act of 1918) a contribution in furtherance of a scheme which is for the time being certified by the board of trade under this section the contribution shall, insofar as it is paid in furtherance of the primary object of the scheme, be allowed to deduct as an expense in computing the profits or gains of the said trade."

It is then stated that the board of trade shall certify a scheme under the section if the board is satisfied "that the primary object of the scheme is the elimination of redundant works or machinery or plant from use in an industry in the United Kingdom."

The report states that British industrialists fully appreciate the limited application of the concession and realize that it will not benefit individual concerns or small groups of an industry acting alone. They welcome it as legalizing for the first time the setting off of a capital charge against revenue.

FOUR METHODS PRESCRIBED FOR WORKS CONTRACTS

The President last week issued an executive order prescribing rules and regulations relating to methods of prosecuting projects under the works progress program.

As laid down in the regulations all projects must be prosecuted under one of four methods: (1) force account, (2) fixed price contract, (3) limited price contract, and (4) management contract.

It is provided that the method may be designated in the application for allotment, but is subject to the approval of Harry L. Hopkins, works progress administrator, who may designate that another method be used.

On each job, by whatever method prosecuted, not fewer than 90 per cent of all employes, must be taken from relief rolls and be certified by the United States employment service.

Keeper of the Codes

Prentiss L. Coonley, director of the Walworth Co., recently appointed director of the division of business co-operation of the rejuvenated NRA. If permitted under an arrangement being worked out between NRA and the federal trade commission, he will receive voluntary codes for maintaining wage, hour and ethical standards.
Wide World photo

Industrial Men in the Day's News

S. D. WILLIAMS has been named manager of tube sales for Timken Steel & Tube Co., Canton, O. He has been active with the steel industry since graduating from Lehigh university as a metallurgical engineer in 1913. He started work with the Carnegie Steel Co. at Homestead, Pa., subsequently becoming superintendent of open-hearth operations for the Central Iron & Steel Co., Harrisburg, Pa. Later he became associated with the Pittsburgh Crucible Steel Co., Midland, Pa., as chief metallurgist, and in 1926 joined Timken Steel & Tube as metallurgical sales engineer, being made assistant director of sales in 1932, which position he filled until his recent promotion.

♦ ♦ ♦

Dennis E. Benbow, formerly superintendent of sheet mills of Australian Iron & Steel Co. Ltd., Sydney, Australia, has returned to his home in New Philadelphia, O. Mr. Benbow spent the last year and a half in Australia installing a sheet mill for the Australian producer. Prior to leaving the United States he was superintendent of the sheet and jobbing division of the Sparrows Point, Md., plant of Bethlehem Steel Co.

♦ ♦ ♦

Don D. Smith, formerly vice president and general sales manager of the Richmond Radiator Co., New York, has been appointed director of sales of the plumbing ware division of Briggs Mfg. Co., Detroit. The new Briggs ware was exhibited for the first time at the annual convention of the National Association of Master Plumbers in Chicago last week. It includes bath tubs, lavatories, kitchen sinks and other utilities made of drawn metal.

♦ ♦ ♦

James J. Zimmerman, formerly statistician for the Eastern Bituminous Coal association, Altoona, Pa., has become associated with the Osborn Machine Co., DuBois, Pa. His previous affiliations include the Elliott Co., Jeannette, Pa., Scott Foundry department of the Reading Iron Co., Reading, Pa., and the Cambria Steel Co., Johnstown, Pa.

♦ ♦ ♦

Donald A. Crosset has been appointed secretary-treasurer and general manager of the Alloy Metal Wire Co. Inc., Moore, Pa. He has been active with the company since its organization 16 years ago, advancing to the office of secretary and engineering director prior to his recent promotion. The company supplies wire, strip, and ribbon of nickel, copper and nickel-chrome alloys for electrical resistance applications, as well as stainless steel wire rod and strip.

♦ ♦ ♦

Thomas C. Swope has been appointed sales representative in Texas and Louisiana for the Kennedy Valve Mfg. Co., Elmira, N. Y. His headquarters will be in Beaumont, Tex.

♦ ♦ ♦

Mark Spraley, for several years assistant sales manager of the Joyce-Cridland Co., Dayton, O., has been appointed sales manager of the pump division of Acme Machine Products Co., Muncie, Ind.

♦ ♦ ♦

Clarence E. Jacobsen, for the past eight years assistant purchasing agent and traffic manager of Modine Mfg. Co., Racine, Wis., has resigned, to become secretary of the Valley Forge Steel & Tool Co., Chicago. He will devote his time to sales work, succeeding Clarence W. Krueger, who has been named vice president of Latrobe Tool Mfg. Co., with headquarters in Chicago at 100 South Jefferson street.

♦ ♦ ♦

Paul J. Kruesi, president of the Southern Ferro Alloys Co., Chattanooga, Tenn., has been awarded the honorary degree of doctor of science by Union college, Schenectady, N. Y. He is a former assistant secretary of commerce, and for two years served as president of the American Electrochemical society.

♦ ♦ ♦

Karl W. Gass has been named chief engineer for the Amsler-Morton Co., Pittsburgh, engineer and con-

O. W. Irwin, Manager, Concrete Bar Bureau, Carnegie Steel Co.

He has wide experience in the engineering and selling of reinforcing bars and steel joists.

Active in trade association work, he assisted in forming two groups concerned with the above products.

During the life of the late lamented NRA, he participated in drawing up a number of industry codes.

O. W. IRWIN, made manager of the concrete bar bureau for Carnegie Steel Co., Pittsburgh, June 1, brings to the Carnegie organization a wealth of engineering and selling experience in the reinforcing bar business.

He attended Wooster college, Wooster, O., and is a graduate in civil engineering from Case School of Applied Science, Cleveland. He has been associated for many years with Truscon Steel Co., Youngstown, O., recently as vice president in charge of the reinforcing bar and steel joist departments. In addition, he has been active in trade association work and helped organize both the Concrete Reinforcing Steel institute and the Steel Joist institute, being president of the former from 1931 to 1933 and secretary of the latter for several years.

He has served in formation work of codes for reinforcing materials, steel joists and wire reinforcement, as well as with the former code authority of the reinforcing materials fabricating industry since the beginning of NRA.

He is a member of the American Concrete institute, American Society of Civil Engineers and other organizations.

tractor. From 1916 until recently associated with the Fort Pitt Engineering Co., Pittsburgh, in design, sale and construction of various types of mechanical equipment, for the past year he has also been engineer in charge of operation and handling of all mechanical construction equipment in the department of public works, Pittsburgh.

♦ ♦ ♦

C. W. McDaniel has been elected a director of the Fostoria Pressed Steel Co., Fostoria, O., succeeding E. W. Allen, resigned.

♦ ♦ ♦

K. E. Kellenberger, Union Switch & Signal Co., Swissvale, Pa., has been elected president of the Pittsburgh Advertising club.

♦ ♦ ♦

O. Q. Hinds, formerly road machinery supervisor for the Allis-Chalmers Mfg. Co., Milwaukee, has been named special road machinery representative for the Caterpillar Tractor Co., Peoria, Ill.

♦ ♦ ♦

William Reid has been appointed general manager of the reorganized Davy Bros. Ltd., Sheffield, England. E. J. Fox, Albert Peech and R. F. Norland head the revised board of directors of the company.

♦ ♦ ♦

H. P. Boggis, 2075 East Seventy-ninth street, Cleveland, is now handling the sale of cutters manufactured by the Ingersoll Milling Machine Co., Rockford, Ill., in the Cleveland and northern Ohio territories.

♦ ♦ ♦

E. R. Shequine has been appointed New York district manager of the industrial stoker division, Combustion Engineering Co. Inc., New York. He will direct sales in metropolitan New York and northern New Jersey.

♦ ♦ ♦

Fred W. Kulicke has been appointed Philadelphia representative of Rollway Bearing Co. Inc., with offices at 14-18 West Chelton avenue, Philadelphia. He will cover the New York city and Philadelphia districts.

♦ ♦ ♦

M. B. Skipper has returned to the sales staff of the Read Machinery Co. Inc., York, Pa., manufacturer of mixers for the chemical and industrial trade, as manager of sales in the Chicago district offices at 407 South Dearborn street.

♦ ♦ ♦

D. A. Bailey, for ten years affiliated with Judson Steel Corp., San Francisco and Emeryville, Calif., has been appointed general superintendent of the open-hearth and rolling mill plants to succeed the late Nicholas Becker.

♦ ♦ ♦

H. C. Sturman recently has been placed in charge of sales of the material handling division, Richards-Wilcox Mfg. Co., Aurora, Ill. Formerly he was connected wtih H. D. Conkey & Co. and the American Engineering Co., Philadelphia.

♦ ♦ ♦

Sloan Hurwitz, Hurwitz Bros. Iron & Metal Co., Buffalo, has been elected president of the western New York chapter of the Institute of Scrap Iron and Steel. Other officers include: Vice president, N. H. Jacobs, Buffalo Housewrecking & Salvage Co.; and secretary-treasurer, John E. Farrell, Buffalo.

John Hunt, M. J. Hunt's Sons Co., Philadelphia, has been elected president of the reorganized Philadelphia chapter of the scrap institute. Other officers: Vice president, Walter S. Gates, Charles Dreifus Co.; secretary, George Stout, Luria Bros. & Co. Inc.; and treasurer, Philip Bailis, Max Bailis & Sons.

♦ ♦ ♦

E. B. Meyer, chief engineer, Public Service Electric & Gas Co., Newark, N. J., has been elected president of the American Institute of Electrical Engineers for the year beginning Aug. 1.

Henry E. Warren, president, Warren Telechron Co., Ashland, Mass., is recipient of the Lamme medal of the A. I. E. E. for "meritorious achievement in the development of electrical appliances for machines." The certificate of award cited specifically his work in utilizing commercial alternating current for the purpose of timekeeping, and his invention of a new electric motor.

♦ ♦ ♦

Wallace T. Montague is the new manager of sales planning and development in the abrasive division of the Norton Co., Worcester, Mass. The abrasive division, recently created to handle sales activities of all abrasive products of the company, embraces two departments—sales planning and development, and sales operation.

W. R. Moore becomes sales manager of the sales operation section, responsible for directing all office and field sales operations, including the sales engineering department. His assistants will be E. C. Hughes, handling wheel, grain and pulpstone sales; and Robert Kirkpatrick, han-

(*Please turn to Page* 80)

Quarter Century of Refractories

TWENTY-FIVE years may not be a great length of time so far as the life of an industrial organization goes, but in a quarter of a century many remarkable changes come about in manufacturing technique and equipment.

This fact is emphasized by surveying the progress of the A. P. Green Fire Brick Co., Mexico, Mo., in the years since 1910. The company recently celebrated its silver anniversary and to mark the occasion issued a booklet telling in words and pictures the story of the company from its inception.

A. P. Green

A. P. Green, president of the company, took over the property of the Mexico Brick & Fire Clay Co. in 1910 and set out on a path of building and expanding which today has led to the reported largest independent company in the refractories industry.

Located in Audrain county, Missouri, in the eastern portion of the state, close by extensive fields of fire clay, the company expanded steadily and by 1917 had grown to three times its original size. A second plant then was built, with larger kilns and improved equipment.

In 1925 the first tunnel-kiln plant in the West was erected, and later additions have been made to this structure. A complete engineering laboratory is a fundamental element of the business which now produces over 50 varieties of refractory products, compared with six in 1910.

Large deposits of diaspore in the Ozark region of Missouri have aided the company in developing high-alumina brick, characterized by low expansion and contraction, and high heat resistance.

The company's products have been shipped to over 60 countries the world over, and distributors are located throughout this country.

Climaxing the silver anniversary celebration, Mr. Green was awarded the honorary degree of doctor of engineering May 25 by the Missouri School of Mines, Rolla, Mo.

1934 Steel Ingot and Casting Output

American Iron and Steel Institute Official Figures Show 12.13 Per Cent Rise from 1933, Passing Total Made in 1931, at 46.1 Per Cent of Record of 1929

TOTAL STEEL PRODUCTION (Includes steel for castings)

Years	Open hearth			Bessemer	Crucible	Electric	Total
	Basic	Acid	Total				
1920	31,375,723	1,296,172	32,671,895	8,883,087	72,265	505,687	42,132,934
1921	15,082,564	507,238	15,589,802	4,015,938	7,613	170,444	19,783,797
1922	28,387,171	921,812	29,308,983	5,919,298	28,606	346,039	35,602,926
1923	34,665,021	1,234,636	35,899,657	8,484,088	44,079	515,872	44,943,696
1924	30,719,523	857,827	31,577,350	5,899,590	22,473	432,526	37,931,939
1925	37,087,342	947,146	38,034,488	6,723,962	19,562	615,512	45,393,524
1926	39,653,315	1,038,664	40,691,979	6,934,568	15,493	651,723	48,293,763
1927	37,144,268	924,067	38,068,335	6,191,727	9,036	666,087	44,935,185
1928	43,200,483	913,473	44,113,956	6,620,195	7,769	802,260	51,544,180
1929	47,232,419	1,120,469	48,352,888	7,122,509	6,645	951,431	56,433,473
1930	34,268,316	780,856	35,049,172	5,035,459	2,253	612,599	40,699,483
1931	22,130,398	379,168	22,509,566	3,023,446	1,547	410,942	25,945,501
1932	11,742,682	164,648	11,907,330	1,532,076	645	241,111	13,681,162
*1933	20,057,146	324,526	20,381,672	2,428,791	681	421,203	23,232,347
*1934	23,256,417	274,688	23,531,105	2,162,357	531	361,296	26,055,289

STEEL INGOT PRODUCTION (BY PROCESSES)

Years	Open hearth			Bessemer	Crucible	Electric	Total
	Basic	Acid	Total				
1920	30,926,393	759,102	31,685,495	8,778,107	70,536	347,254	40,881,392
1921	14,864,607	290,750	15,155,357	3,977,129	6,877	84,721	19,224,084
1922	27,961,190	517,045	28,478,235	5,871,565	27,561	191,057	34,568,418
1923	34,093,711	653,337	34,747,048	8,416,576	42,127	279,914	43,485,665
1924	30,263,005	454,926	30,717,931	5,846,153	21,096	225,977	36,811,157
1925	36,632,060	484,843	37,116,903	6,670,128	17,729	335,978	44,140,738
1926	39,172,688	533,285	39,705,973	6,891,502	13,452	325,278	46,936,205
1927	36,750,387	493,653	37,244,040	6,153,703	7,696	371,278	43,776,717
1928	42,818,557	454,883	43,273,440	6,591,745	6,516	453,692	50,325,393
1929	46,644,206	576,393	47,220,599	7,091,680	5,762	532,392	54,850,433
1930	33,898,518	367,181	34,265,699	5,020,588	1,563	307,418	39,595,268
1931	21,986,933	194,388	22,181,321	3,011,394	831	235,376	25,428,922
1932	11,689,495	104,794	11,794,289	1,528,544	241	141,328	13,464,402
*1933	19,972,805	195,495	20,168,300	2,425,779	399	299,808	22,894,286
*1934	23,235,688	201,073	23,436,761	2,162,357	531	349,095	25,948,744

PRODUCTION OF DUPLEX STEEL

Years	Gross tons	Years	Gross tons	Years	Gross tons
1920	3,279,119	1925	2,797,318	1930	2,045,277
1921	840,251	1926	2,815,980	1931	945,844
1922	1,651,089	1927	2,184,674	1932	289,263
1923	2,919,286	1928	2,232,197	1933	386,154
1924	2,131,856	1929	2,961,292	1934	591,373

PRODUCTION OF ALLOY STEEL INGOTS AND CASTINGS

Years	Ingots	Castings	Total	Years	Ingots	Castings	Total
1920	1,591,939	68,353	1,660,292	1928	3,045,225	169,684	3,214,909
1921	769,293	40,255	809,548	1929	3,764,287	192,920	3,957,207
1922	1,614,392	59,104	1,673,496	1930	2,317,183	126,128	2,443,311
1923	2,014,269	92,220	2,106,489	1931	1,366,010	89,903	1,455,913
1924	1,940,461	85,948	2,026,409	1932	757,560	41,044	798,604
1925	2,320,390	112,583	2,432,973	1933	1,475,400	71,783	1,547,183
1926	2,317,313	146,101	2,463,414	*1934	1,596,544	16,731	1,612,275
1927	2,385,904	145,844	2,531,748				

PRODUCTION OF ALLOY STEEL INGOTS AND CASTINGS (BY PROCESSES)

Processes	1931	1932	1933	†1934
Open hearth steel—basic	1,131,491	616,719	1,169,255	1,278,343
Open hearth steel—acid	57,864	27,236	57,097	34,540
Bessemer steel	34,044	13,651	24,519	53
Crucible steel	401	121	102	103
Electric steel	232,113	140,877	296,210	299,236
Total	1,455,913	798,604	1,547,183	1,612,275

*The figures reported include estimates for one company which reported in previous years but has failed to report for 1933 and 1934.

†The figures for 1934 include only that portion of the steel for castings which was produced in foundries operated by companies producing steel ingots.

PRODUCTION OF ALL KINDS OF FINISHED ROLLED IRON AND STEEL BY STATES

States	1930	1931	1932	*1933	*1934
Maine, Mass.	173,320	145,601	110,050	175,506	158,559
R. I., Conn.					
New York	1,268,912	854,366	473,952	646,923	800,338
New Jersey	117,424	69,890	51,585	73,199	86,466
Pennsylvania	10,519,101	6,342,594	3,269,548	5,059,366	5,619,410
Del., Md., Va.	1,049,905	749,155	416,754	711,862	788,824
West Virginia	983,677	814,135	445,369	779,914	797,039
Ky., Tenn., Ga., Texas	422,455	400,258	269,859	366,553	401,305
Alabama	934,747	788,370	367,902	567,819	628,409
Ohio	6,071,154	4,086,634	2,311,419	3,974,493	4,301,239
Indiana	3,844,018	2,256,869	1,126,275	1,984,423	2,446,052
Illinois	2,217,049	1,391,357	737,803	1,150,087	1,311,243
Mich., Wis., Minn.	823,643	622,601	456,964	686,760	923,724
Mo., Okla.	257,007	194,473	142,080	149,014	167,112
Col., Wash.	526,538	269,315	146,980	166,180	246,999
Cal., Canal Zone	304,057	190,276	124,548	242,987	292,787
Total	29,513,007	19,175,894	10,451,088	16,735,086	18,969,506

PRODUCTION OF ALL KINDS OF FINISHED ROLLED IRON AND STEEL IN 1934* BY PRODUCTS

	Steel	Iron	Total
FLAT ROLLED PRODUCTS:			
Plates (sheared and universal)	1,437,704	75	1,437,779
Sheets	3,192,785	9,820	3,202,605
Strip	2,195,793	1,047	2,196,840
Hoops	48,808	.....	48,808
Cotton ties and baling bands	28,300	.....	28,300
Black plate	1,735,431	.....	1,735,431
Total	8,638,821	10,942	8,649,763
BARS:			
Merchant	2,711,074	91,353	2,802,427
Concrete reinforcement	486,950	54	487,004
Total Bars	3,198,024	91,407	3,289,431
Structural shapes	1,425,035	5	1,425,040
Sheet piling	107,843	.....	107,843
Rails	1,010,224	.....	1,010,224
Long splice bars, tie plate bars, etc.	339,306	8,986	348,292
Skelp	1,071,505	48,712	1,120,217
Blanks or pierced billets for seamless tubes	824,542	.....	824,542
Wire rods	1,723,219	546	1,723,765
Car wheels (rolled steel)	76,473	.....	76,473
Cross ties	10,891	.....	10,891
Rolled forg. blooms, billets and axle blanks	211,122	1,217	212,339
Blooms, billets, slabs and sheet bars for export	23,363	.....	23,363
All other fin. hot rolled products	146,998	325	147,323
Total	6,970,521	59,791	7,030,312
Grand total	18,807,366	162,140	18,969,506

PRODUCTION OF TIN AND TERNE PLATE AND LONG TERNE SHEETS

Years	Tin plate	Iron and steel terne plate and long terne sheets			Grand total
		Terne plate	Long terne sheets	Total	
1920	1,374,979	35,700	34,866	70,566	1,445,545
1921	747,911	37,591	8,772	46,363	794,274
1922	1,208,772	48,973	30,150	79,123	1,287,895
1923	1,414,404	44,795	47,663	92,458	1,506,862
1924	1,328,228	42,217	48,209	90,426	1,418,654
1925	1,544,007	40,654	73,134	113,788	1,657,795
1926	1,674,322	39,922	68,062	107,984	1,782,306
1927	1,583,383	37,043	68,023	105,066	1,688,449
1928	1,714,990	33,578	90,637	124,215	1,839,205
1929	1,816,223	38,842	113,215	152,057	1,968,280
1930	1,660,325	20,585	82,533	103,118	1,763,443
1931	1,392,227	15,581	51,135	66,716	1,458,943
1932	986,217	10,882	35,408	46,290	1,032,507
1933	1,685,826	18,969	64,303	83,272	1,769,098
1934	1,502,918	32,983	67,328	100,311	1,603,229

in Moderate Gain Over Previous Year

Flat-Rolled Products Increase 6.18 Per Cent—Most Steel Products Make About Parallel Growth, but Tin and Terne Plate Show Slight Regression

PRODUCTION OF SEAMLESS, LAP-WELD, BUTT-WELD, AND ELECTRIC-WELD PIPE AND TUBES IN 1934

SEAMLESS PIPE AND TUBES*

	Standard pipe	Line pipe	Oil country goods	Boiler tubes	Mechanical tubes	Miscellaneous	Total
Hot finished †	12,524	68,988	481,269	65,534	21,059	8,405	657,779
Cold drawn	860	1,735	2,659	11,968	57,181	462	74,865
Total	13,384	70,723	483,928	77,502	78,240	8,867	732,644

LAP-WELD AND BUTT-WELD PIPE AND TUBES*

Steel	618,583	98,126	74,121	10,827	.....	22,330	823,987
Iron	27,880	865	5,908	3,143	.....	151	37,947
Total	646,463	98,991	80,029	13,970	.....	22,481	861,934

ELECTRIC-WELD PIPE AND TUBES*

Steel	24,172	14,677	43,904	.....	34,562	112,402	229,717
Iron	.....	.....	.....	‡	.....	2,390	2,390
Total	24,172	14,677	43,904	‡	34,562	114,792	232,107

* Production of black pipe, including stainless steel pipe and black pipe subsequently galvanized, sherardized, or enameled.

† Does not include hot finished tubes subsequently cold drawn.

‡ Production included in miscellaneous.

PRODUCTION OF CONCRETE REINFORCEMENT BARS

Years	Steel	Iron	Total	Rolled from new steel	Rolled from old rails
1925	818,392	1,195	819,587	*	*
1926	814,180	1,649	815,829	*	*
1927	813,585	2,428	816,013	*	*
1928	951,426	462	951,888	*	*
1929	963,043	557	963,600	*	*
1930	849,991	160	850,151	682,681	167,470
1931	643,529	104	643,633	500,055	143,578
1932	385,436	169	385,605	275,115	110,490
1933	369,498	775	370,273	294,349	75,924
1934	486,950	54	487,004	383,627	103,377

*Data not available.

PRODUCTION OF FLAT ROLLED PRODUCTS

	1930	1931	1932	1933	1934
PLATES:					
Universal	1,040,715	614,837	309,653	311,747	534,784
Sheared	2,622,108	1,351,375	520,177	848,635	902,995
Total	3,662,823	1,966,212	829,830	1,160,382	1,437,779
SHEETS & STRIP:					
Black sheets	3,511,557	2,461,494	1,471,532	3,092,410	3,202,605
Strip	1,911,862	1,620,971	1,185,184	1,830,106	2,196,840
Hoops	79,844	56,003	42,697	48,344	48,808
Cotton ties & baling bands	46,194	57,112	37,725	51,081	28,300
Total	5,579,457	4,195,580	2,737,138	5,021,941	5,476,553
BLACK PLATE:					
For tinning	1,691,928	1,431,293	999,528	1,676,701	1,499,877
All other	201,048	180,582	142,418	287,157	235,554
Total	1,892,986	1,611,875	1,141,946	1,963,858	1,735,431
Grand total	11,135,266	7,773,667	4,708,914	8,146,181	8,649,763

PRODUCTION OF PLATES, SHEETS AND STRIP (BY SIZE)

	1931	1932	1933	1934
	a	a	a	
UNIVERSAL PLATES:				
6 ⅜" to 48" wide—¼" & thicker	.....	.....	290,232	476,480
48 ⅛" & wider—.1875" & thicker	.....	.....	21,515	58,354
Total	.....	.....	311,747	534,784
SHEARED PLATES:				
6 ⅜" to 48" wide—¼" & thicker	.....	.....	424,084	436,623
48 ⅛" & wider—.1875" & thicker	.....	.....	424,551	466,372
Total	.....	.....	848,635	902,995
BLACK SHEETS:				
Hot rolled—16 ga. & heavier (c)	.....	.....	727,442	1,036,244
Hot rolled Ann.—17 ga. & lighter (d)	.....	.....	2,364,968	2,166,361
Total	.....	.....	3,092,410	3,202,605
STRIP (e):				
To and incl. 6" in width	619,354	315,429	669,389	672,997
Over 6" and incl. 24" in width	560,891	410,438	b1,160,717	1,523,843
Over 24" in width	440,726	459,317	.....	.....
Total	1,620,971	1,185,184	1,830,106	2,196,840

(a) New classification adopted January 1, 1933.

(b) Over 6" to and including 23 ⅝" from January 1, 1933.

(c) Hot rolled sheets—24" to 48" in width by .249" to .059" in thickness; 48 ⅛" and over in width by .1874" to .059" in thickness.

(d) Hot rolled annealed sheets—3½" and less in width by .024" and less in thickness; 3 ⅝" to 6" in width by .034" and less in thickness; 6 ⅜" to 23 ⅝" in width by .058" and less in thickness; 24" to 48" in width by .058" and less in thickness; 48 ⅛" and over in width by .058" and less in thickness.

(e) Hot rolled strip—flats 3½" and under in width by .249" to .025" in thickness; 3 ⅝" to 6" in width by .249" to .035" in thickness; 6 ⅜" to 23 ⅝" in width by .249" to .059" in thickness

PRODUCTION OF MERCHANT BARS

Years	Steel	Iron	Total	Years	Steel	Iron	Total
1925	5,368,827	290,488	5,659,315	1930	4,036,739	95,234	4,131,973
1926	5,221,399	252,437	5,473,836	1931	2,387,420	52,943	2,440,363
1927	4,682,252	187,995	4,870,247	1932	1,284,839	29,057	1,313,896
1928	6,112,558	165,277	6,277,835	1933	2,244,688	40,088	2,284,776
1929	6,305,206	154,690	6,459,896	*1934	2,711,074	91,353	2,802,427

*Includes bolt, nut and rivet, spike and chain, toe calk, horseshoe, finger, staybolt and all other miscellaneous bars which in 1933 and prior years were included in "all other" miscellaneous hot rolled products.

PRODUCTION OF SKELP

Years	Steel	Iron	Total
1925	3,051,182	178,586	3,229,768
1926	3,574,776	189,774	3,764,550
1927	3,262,648	156,204	3,418,852
1928	3,228,655	140,318	3,368,973
1929	3,365,682	151,556	3,517,238
1930	2,567,620	114,426	2,682,046
1931	1,428,503	70,777	1,499,280
1932	575,608	31,991	607,599
1933	958,558	35,957	994,515
1934	1,071,505	48,712	1,120,217

PRODUCTION OF HEAVY AND LIGHT STRUCTURAL SHAPES

Years	Heavy shapes	Light shapes	Total	Years	Heavy shapes	Light shapes	Total
1925	3,049,817	554,313	3,604,130	1930	3,010,847	501,626	3,512,473
1926	3,330,572	581,091	3,911,663	1931	1,768,374	294,484	2,062,858
1927	3,083,211	659,234	3,742,445	1932	782,570	154,658	937,228
1928	3,408,545	687,598	4,096,143	1933	853,914	255,543	1,109,457
1929	4,055,615	722,405	4,778,020	1934	1,131,133	293,907	1,425,040

Activities of Steel Users and Makers

LASALLE STEEL CO., Palmolive building, Chicago, has appointed T. H. Deveney & Co., Peachtree Arcade building, Atlanta, Ga., its sales agent for Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, the Carolinas, Tennessee, Virginia and West Virginia. Earl R. Waddell, Fort Worth, Tex., has been appointed sales agent for Oklahoma and Texas, except El Paso, Tex. These agents will handle carbon and alloy grades of cold-finished steel bars and shafting, special shapes, cold-finished or hot-rolled and heat-treated bar stock in hot-rolled or cold-finished.

♦ ♦ ♦

Carboloy Co. Inc., Detroit, manufacturer of cemented carbide tools and dies, has appointed Hartley Wire Die Co., Waterbury, Conn., authorized distributor of its dies.

♦ ♦ ♦

Standard Fuel Engineering Co., Detroit, has appointed E. B. Packard Co., 30 Church street, New York, sales representative in the New York district for its refractory cements and similar products.

♦ ♦ ♦

Wrought Washer Mfg. Co., Milwaukee, has introduced a new type paper carton packing for expansion plugs in quantities from 10 to 25 units per box. This makes possible a wide range of sizes in modest inventory.

♦ ♦ ♦

Kirkby Machinery & Supply Co., 20 St. Clair street, Toledo, O., has been made distributor by the Diamond Chain & Mfg. Co., Indianapolis. Stocks of roller chain, sprockets and flexible couplings are carried for prompt service.

♦ ♦ ♦

Erie Foundry Co., Erie, Pa., has appointed General Machinery Corp., 120 Federal street, Boston, as its representative in New England, except Connecticut. It will handle the Erie line of forge shop equipment, hydraulic presses and rubber mill machinery.

♦ ♦ ♦

Continental Roll & Steel Foundry Co., Grant building, Pittsburgh, has established a New York office at 50 East Forty-second street, in charge of John J. Murray, who was formerly representative in New York for Detroit Steel Casting Co. and the Swedish Crucible Steel Co.

♦ ♦ ♦

Automotive Fan & Bearing Co., Jackson, Mich., manufacturer of automotive fans and mufflers, industrial fans, aircraft wheels and brakes, has been reorganized as Hayes Industries Inc. All assets, patent rights and goodwill have been taken over. C. B. Hayes, formerly head of Hayes Wheel Co. and now a director of Kelsey-Hayes Wheel Co., is president and general manager. Charles Hollerith continues as vice president and director of engineering and E. C. Hetherwick is secretary-treasurer. These three, with John W. Miner and Don T. McKone, make up the new directorate.

♦ ♦ ♦

Carondelet Foundry Co., St. Louis, F. C. Thompson president, is installing a 3000-pound rocking furnace for high-strength alloy castings, increasing capacity eight tons daily.

Steelmakers Interested in Warehouses in New York

Steel producers are showing an increasing interest in the establishment of their own warehouses in the New York district. At least three large producers are involved in current rumors, with one said to be completing negotiations for properties in Brooklyn.

One leading producer has long maintained general warehouse facilities in New York, and in recent years a few others have established jobbing facilities for certain products, but there were no important new developments along this line until the Jones & Laughlin Steel Corp. recently, as noted at the time, acquired the properties of the National Bridge Works, Long Island City, for distribution facilities. This acquisition, it is believed, has given impetus to negotiations by other producers.

1935 Iron and Steel Works Directory Issued

American Iron and Steel institute, New York, last week issued the twenty-second edition of the *Directory of Iron and Steel Works of the United States and Canada*, which is a complete revision of the 1930 edition.

The main part of the new directory consists of a list of concerns engaged in the iron and steel industry. To facilitate comparisons with earlier editions a special list has been included containing appropriate reference to all concerns listed in 1930 but which since then have gone out of business.

The price per copy, bound in cloth, is $8, postpaid, to members of the institute, and $10, postpaid, to nonmembers.

The directory will be supplied by STEEL, 1213 West Third street, Cleveland; in Europe by Penton Publishing Co. Ltd., Caxton House, Westminster, London.

Died:

A. B. WILDER, 70, president of Lyle Signs Inc., Minneapolis, and treasurer of St. Paul Corrugating Co., St. Paul, June 16. He was a pioneer manufacturer of corrugated metal culverts, founding his first company at Lyle, Minn., in 1905, which was later moved to Minneapolis. He sold his interest in this company to the American Rolling Mill Co. in 1927, continuing active in the manufacture of metal road and street signs. He was also at one time president of the former Stockland Road Machinery Co., Minneapolis, manufacturer of power patrols and road graders, which later was sold to the Foote Bros. Gear & Machine Co., Chicago.

♦ ♦ ♦

Harvey G. Royce, 74, vice president of the Traverse City Iron Works, Traverse City, Mich., in that city recently.

♦ ♦ ♦

W. S. Sloan, 55, special deputy for the Alabama Fuel & Iron Co., Birmingham, Ala., and for 25 years connected with the company, in Margaret, Ala., June 24.

♦ ♦ ♦

Edward G. Caughey, 69, research engineer for Weirton Steel Co., Weirton, W. Va., and at one time an executive of the former Standard Steel Car Co., Butler, Pa., in Sewickley, Pa., June 22.

♦ ♦ ♦

F. Murray Wilson, 48, works auditor for the Tennessee Coal, Iron & Railroad Co., Birmingham, Ala., and associated with the company for over 20 years, in Bessemer, Ala., June 21.

♦ ♦ ♦

George W. Butz, 69, superintendent of the architectural mill department of American Car & Foundry Co., Wilmington, Del., in that city recently. He had been associated with American Car & Foundry for the last 54 years.

♦ ♦ ♦

Edward W. Beadel, 66, for many years president of the Pennsylvania Engineering Works at New Castle, Pa., and later a vice president of the Bethlehem Steel Co., in charge of operations in the Argentine, in New Castle recently. He had retired from active business.

♦ ♦ ♦

Frank O. Wells, 80, founder of the Greenfield Tap & Die Corp., Greenfield, Mass., in that city, June 23. Born in Shelburne Falls, Mass., he was graduated from Petersham academy and went to work as a machine shop apprentice. Later he started his own business, the Wells Bros. Co., later merged with Greenfield Tap & Die.

EDITORIAL

Urge for Efficiency Is Sure Sign of Economic Progress

ONE of the most encouraging signs of improvement in the economic structure of the nation in recent months has been the moderate increase in the demand for productive machinery and allied equipment. The index of domestic machine tool orders for May was substantially higher than in April and established a new high point for the recovery period. At 67.1, the index now is higher than at any time since early in 1930.

The gratifying significance of this development is that at last the production and manufacturing industries again are responsive to the competitive urge for equipment which permits economical operations. It indicates that management again is taking an interest in the old, tried-and-true economic principle that an improved product, manufactured at a lower unit cost, is conducive to lower prices to prospective purchasers, thus generating increased demand, which in turn paves the way for further economies in the cost of production.

Example of Successful Industrial Policy Leads General Manufacturing Trade To Buy

Probably the renewed interest in this policy has been stimulated by the convincing manner in which several industries have demonstrated its effectiveness even under the unfavorable circumstances existing during the depression. No one will deny the fact that much of the success of motor car manufacturers in pushing sales during recent months has been due to their ability to offer unprecedented values at almost unbelievably low prices. The same can be said of the manufacturers of refrigerators, washing machines and other household appliances. A better product and lower prices are the keys to their spectacular success.

With these noteworthy examples for guidance, it is not surprising that executives in many other branches of industry are beginning to seek lower costs. In fact, the psychological pressure for economical and efficient operations again is asserting itself. This aspect of the situation was described realistically by Herman H. Lind, general manager, National Machine Tool Builders' association, at a recent meeting of the Advertising Federation of America, in these words:

"I feel free to touch slightly a psychological side of durable goods recovery. It is not only the individual family which has a desire to 'keep up with the Joneses'. During the depths of the depression it seemed to me that business men were in active competition in talking pessimism, almost bragging as to 'who was the most broke'. We are getting away from that. The company that has been able to come through the depression reasonably well and is now employing more men and making money is glad to tell about it, is glad to tell of the appropriations it is making for new equipment, is happy to inform its customers and sometimes competitors of its modern facilities.

"Customers like to buy products coming from modern plants using the best of machinery. Workmen, foremen, managers and owners all want to work in a plant as well built and equipped with as good machinery as that of their neighbor. This is a propitious sign, far stronger than the urge to 'keep up with the Joneses' is the realized necessity that the broadening of a market for any company means a better product at a lower cost, and contented workmen."

Advantages Are Cumulative in Effects on Builders of Master Tools of Industry

With the tide again running in the direction of increased economy in production and manufacture, it will be interesting to watch its accumulative effect. For instance, the very fact that the demand for machine tools has increased in recent months will stimulate the design of improved models. Each improvement in the design or construction of the "master tools of industry" will be multiplied into benefits to users in the manufacturing industries. These advantages again are increased many fold in the form of the improved products which go to the ultimate consumers—the public.

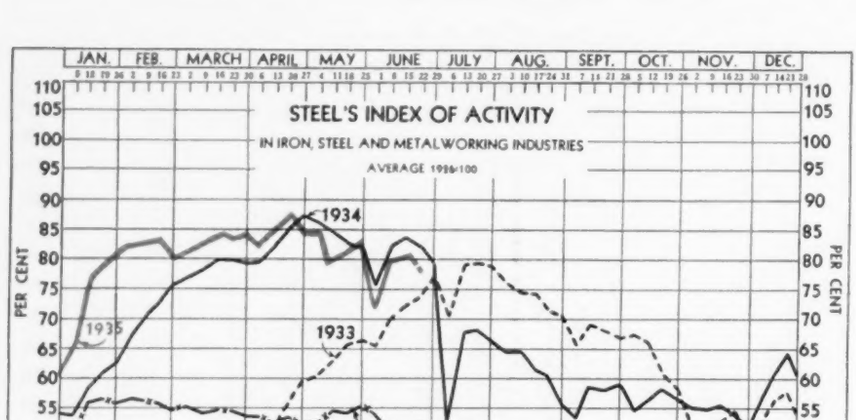
It is this cycle which makes for an evaluation in the standard of living for the people, well-balanced activity for industry, greater security of employment and higher real wages for employes, more profits for investors, and general prosperity and serenity for the nation.

This is the natural, economic path to recovery. If applied to all branches of productive effort, the nation could wade out of the mire of depression in short order.

It is the way to recovery which recognizes the age-old principle that the only way to beat a depression is to increase the "saving-power" of the nation. Savings are increased only as economy is practiced, as thrift is encouraged and promoted, and as the opportunities for profitable achievements are stimulated.

Industry's role in this natural program is primarily one of turning out the best product at the lowest cost. Successful attainment of this objective will bring recovery in spite of political obstacles.

THE BUSINESS TREND



STEEL'S *index of activity in the iron, steel and metalworking industries declined 2.7 points to 77.3 in the week ending June 22:*

Week ending	1935	1934	1933	1932
May 4	84.6	86.0	60.3	54.7
May 11	79.3	84.4	62.5	54.3
May 18	80.5	82.4	65.2	55.1
May 25	82.8	81.9	66.1	54.2
June 1	71.9	75.7	65.3	51.0
June 8	79.3	82.3	69.9	51.1
June 15	80.0†	83.6	72.1	51.8
June 22	77.3*	81.8	73.9	51.6

†Revised. *Preliminary.

The index charted above is based upon freight car loadings, electric power output, automobile assemblies (estimated by Cram's Reports) and the steelworks operating rate (estimated by STEEL). *Average for 1926 equals 100, weighted as follows: Steel rate 40, and car loadings power output and auto assemblies each 20.*

Business Sees Signs of More Promising Last Half

AS BUSINESS crosses the threshhold of the second half, it is difficult to refrain from speculating upon the trend of industrial activity in the next six months.

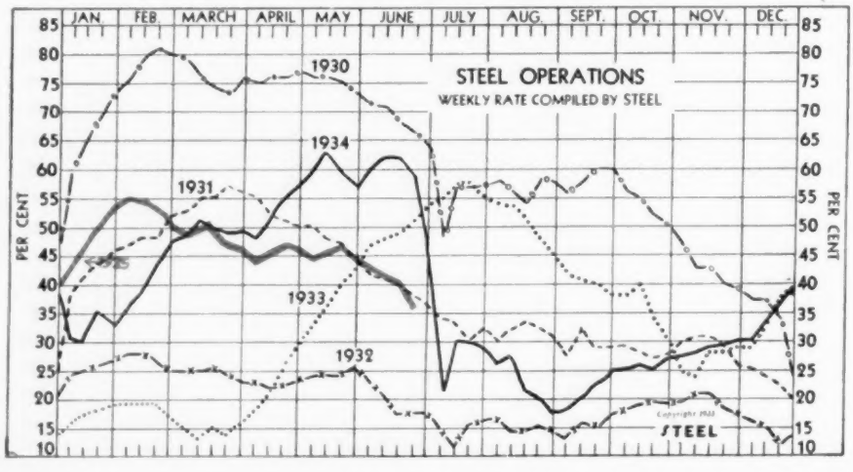
Will operations move to lower levels, as they have consistently in every year since 1928, or will they expand in late summer or early fall, as expected by many business commentators?

At this moment, indications seem to favor the latter alternative. Since early in March, the average of industrial activity, as measured by STEEL's index which is charted above, has adhered rather closely to the trend line for the corresponding period of 1934. The 1935 line will conform to last year's pattern through the week ending July 6. Beyond that week, which includes the holiday of July 4, lies the dog day period during which the extent of the rebound of activity from the holiday low point will give a hint to the degree of expansion that may be expected in late summer and autumn.

It seems improbable that activity will duplicate the tail spin performance of last year. The artificial factors which caused the sharp decline a year ago are not present today. Moreover, most of the political shocks already have been discounted. Also, the general revival of confidence which received its inspiration from the Supreme Court decisions still is gathering strength.

Other favorable factors include the retiming of the introduction of new automobile models, which will stimulate last half production, and the mild but promising improvement in building construction which should carry over into the third quarter. Last but not least is the more diversified demand for machining and allied equipment.

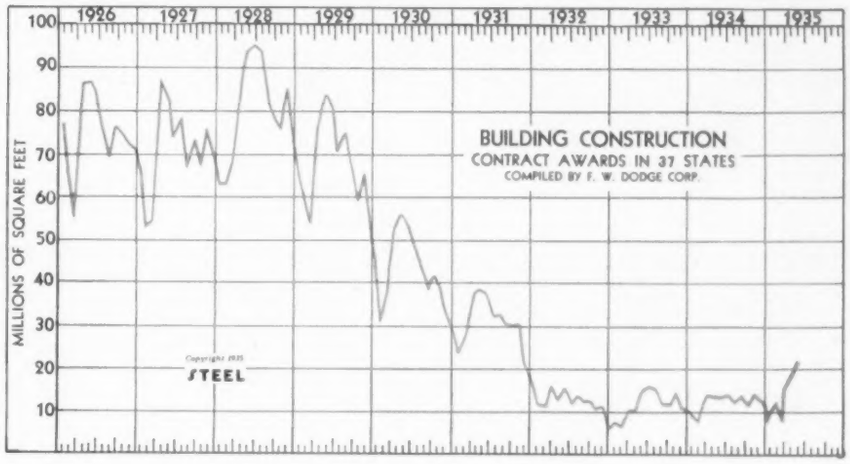
1935	Per Cent
June 22	35.5
June 15	39
June 8	41
June 1	42.5
May 25	44
May 18	44.5
May 11	44.5
May 4	44
April 27	46
April 20	46
April 13	45
April 6	44



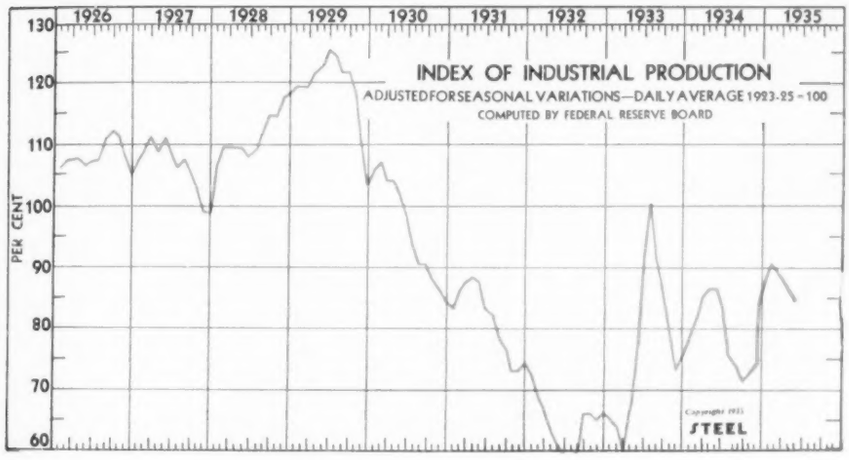
1934	Per Cent
June 23	59
June 16	62
June 9	62
June 2	60
May 26	57
May 19	59
May 12	62
May 5	60
April 28	57
April 21	55
April 14	51
April 7	48

May Building Awards Continue Upward Climb

	Square Feet	
	1935	1934
January	11,245,100	9,568,700
February	9,670,300	8,176,300
March	15,873,100	14,788,900
April	19,981,100	14,207,100
May	22,276,200	14,664,400
June		13,986,500
July		13,250,000
August		14,259,000
September		12,510,300
October		15,098,100
November		12,780,800
December		9,193,306



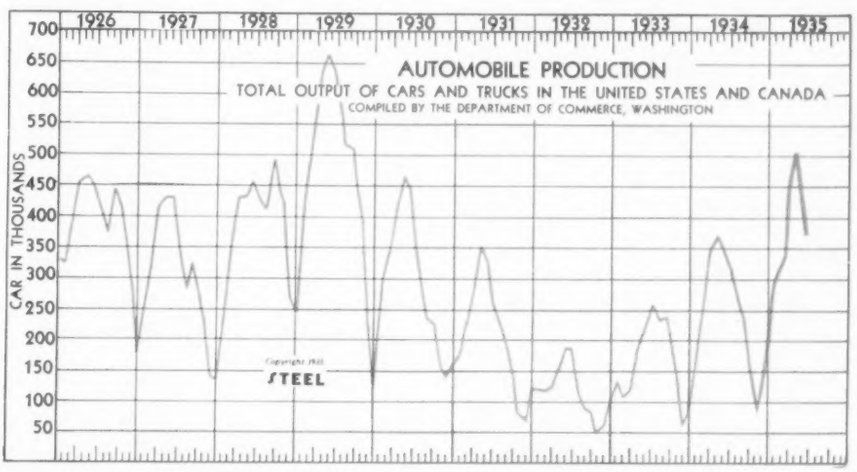
Industrial Production Off Slightly in May



	1935	1934	1933
January	91	78	65
February	89	81	64
March	88	84	60
April	86	85	67
May	85	86	77
June	....	83	91
July	....	75	100
August	....	73	91
September	....	71	84
October	....	73	77
November	....	74	73
December	....	86	75

Automobile Output Registers Seasonal Drop in May

	1935	1934
January	303,372	162,570
February	358,658	238,827
March	451,809	352,614
April	501,837	371,338
May	385,486	350,616
June		320,382
July		276,047
August		244,715
September		175,586
October		135,771
November		85,179
December		156,356



Gears Manufactured Into Transmission Assembly for Quiet Operation

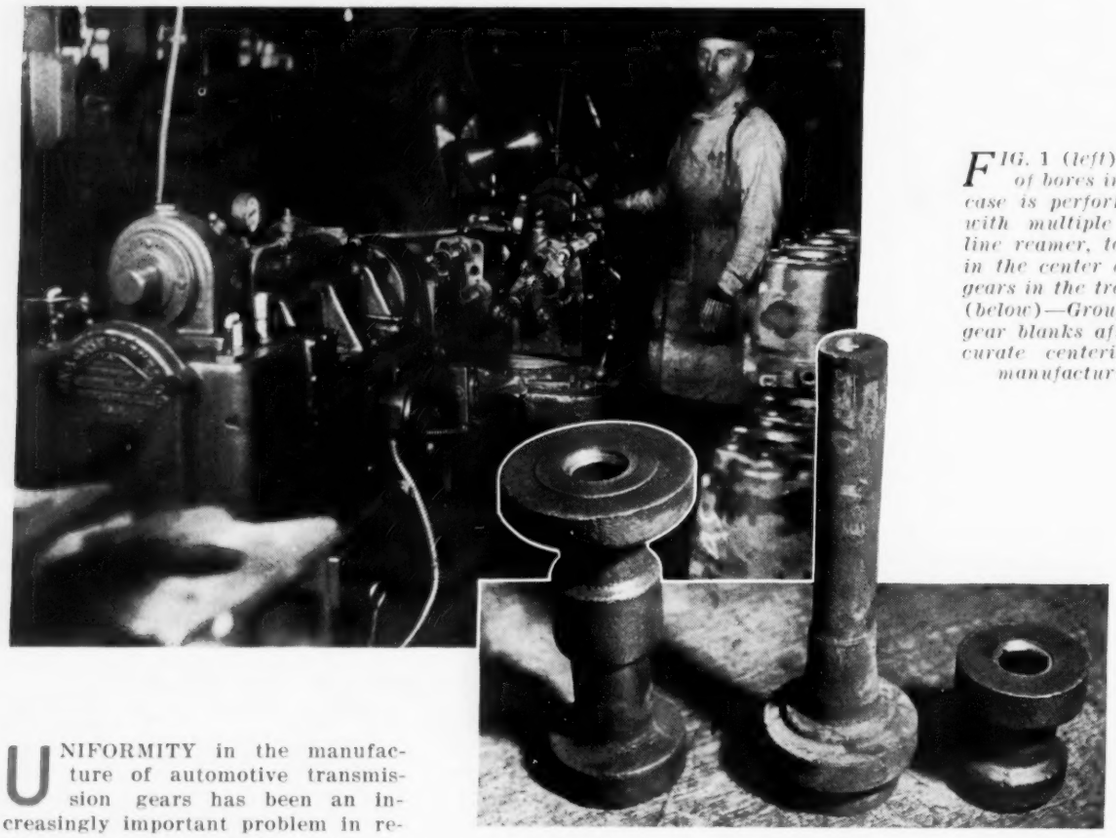


FIG. 1 (left)—Finish reaming of bores in the transmission case is performed in one setup with multiple tooling, on this line reamer, to assure accuracy in the center distances between gears in the transmission. Fig. 2 (below)—Group of transmission gear blanks after centering. Accurate centering precedes all manufacturing operations

UNIFORMITY in the manufacture of automotive transmission gears has been an increasingly important problem in recent years, particularly as the result of public demand for greater quietness. Difficulties in obtaining satisfactory gears center largely around the final operations, including finishing before heat treatment, heat treatment itself, lapping and assembly into the case.

The most accurately machined gears may be entirely unsatisfactory if errors be introduced in assembly into the case. If variations between gears or changes to inaccurate shapes are introduced in heat treatment, or if the always unavoidable changes occurring during the heat treatment are not controlled and compensated for before and after heat treatment, wear and noise result.

Of major interest, therefore, is the effective manner in which the Buick Motor Co. solved these various problems, when it recently set up its own production line for the manufacture of transmission gears.

Buick transmission gears, it might be said, are manufactured into the transmission assembly. Instead of setting up production methods and equipment that could be expected to turn a bar of steel into a finished gear, the gear itself was the starting point. Step by step, in reverse order, were determined the type of equipment and tooling, the production processes, desired tolerances for each stage and part—through heat treatment, finishing, gear cutting, turning and forging until the steel bar was reached.

Even here, however, control did not stop, for by means of the reverse layout method pursued, the desired characteristics for the steel itself were determinable and specifications established for close control of grain size, fiber structure and other qualities.

As a result, the equipment and methods used in the manufacture of Buick transmission gears are probably among, if not the most, modern and consistent in industry. The equipment itself, of course, had to be the most reliably consistent available, since each stage in the production of the gears had to be closely controlled for uniformity. Even the forgings are held to close limits, so that variations in the final product would not be introduced by differences in the amount of stock removed.

Manufacture of these gears, therefore, can be said to start with the

assembly of the gears into the case. All bores of the case are line-reamed simultaneously on a multiple line reamer, shown in Fig. 1. This assures maximum accuracy as to relative location of gear centers and proper relationship of the gears to each other. Without this, the most accurate machining of gears would be wasted.

Centering Is Important

Naturally, the value of such a setup requires that the gear and shaft assemblies in turn be absolutely concentric. Therefore, through all manufacturing operations, gears and shafts are located from fixed centers. This, in turn, required that the first operation following forging must be a true centering of the blank, locating from the outside diameter of the gear blank. Furthermore, the center has to be of such a character that recentering is not required. Fig. 2 shows a group of transmission gear blanks after centering. Note that in addition to the conical "center" in the drive gear, the hole is also cylindrically countersunk. This section extends to the cut-off point, so that end trimming of the piece can be done on centers. The centers themselves are sunk to exact depth, to control lengthwise turning and facing dimensions.

In the hollow gears, including countershaft cluster, second speed and idler gear, the holes are first pierced—piercing being used to assure a uniform and close grain structure in the bore. After piercing, the bores are finished by broaching. For the cluster gear, for instance, there are three broaching operations, rough, semifinish and finish. The broach cutters incidentally, have splines to cut 0.002-inch deep grooves in the hole to keep the bushing from turning after assembly.

In the idler gear, three keyways, 120 degrees apart, are cut in the bore for driving purposes, instead of the usual single keyway. This is done to assure uniform structure and prevent distortion during heat treat by equalizing metal distribution.

Lapped After Heat Treatment

Returning now to the gears, prior to assembly, the final operation on the gear teeth is a lap following heat treat. Equipment used for this is shown in Fig. 3. Each operator takes care of three of these machines. In this operation, the gear is mounted on a driving arbor, or on driving centers, as the case may be, as if it were assembled in the transmission. The gear itself drives the three radially disposed cast iron laps, while the gear moves back and forth axially.

It was found desirable to use the minimum number of strokes possible for lapping, and average lapping time per gear in fact is only 2 minutes. The number of strokes or revolutions of these lappers are therefore fairly well fixed, and the amount of lapping action required, if variations are encountered, is varied by hydraulically regulating the pressure of the laps on the gears.

It is essential that gears be clean and without scale when they reach the lap. To make this possible, the company has developed an interesting heat treatment cycle. Gears are hardened in cyanide baths, although they are not "cyanided." The hardening baths are similar in arrangement to an automatic plating installation, an automatic conveyor being loaded with a fixed charge (as to weight) of gears, and dipping in turn into pre-heating, maximum temperature, and quenching temperature cyanide baths, and also into the quench itself.

Case Hardened Lightly

Following this operation, gears go through a vertical automatic drawing oven. Gears coming out of this heat treat are clean, with no trace of scale. The cyanide produces a case hardening effect, of course, but this is only 0.002 to 0.003-inch deep and works well with the simple final lapping operation.

All steels, of course, distort or "grow" during heat treatment, but with this close control, the change is regulated and standardized closely and is compensated for prior to heat treatment in the gear shaving operation.

This latter operation, shown in Fig. 4, is probably the key to the entire gear machining setup, being

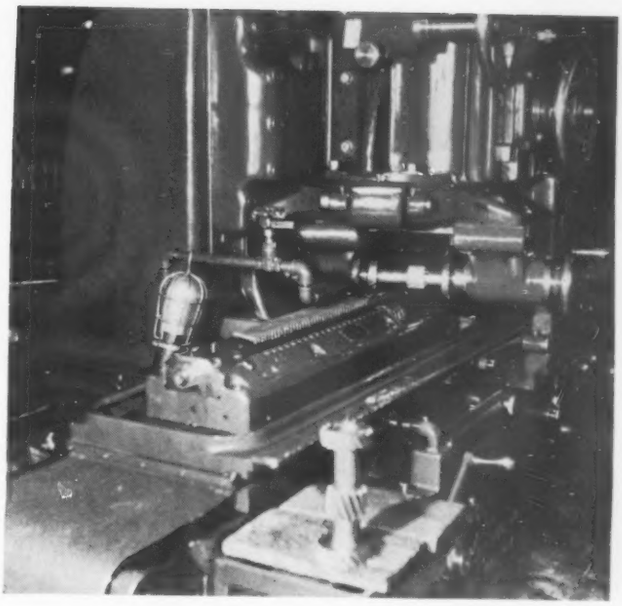


Fig. 4—Key point in the machining line—a gear shaver. The table with the cutters reciprocates while the gear (shown on an arbor) rolls over the rack on free centers

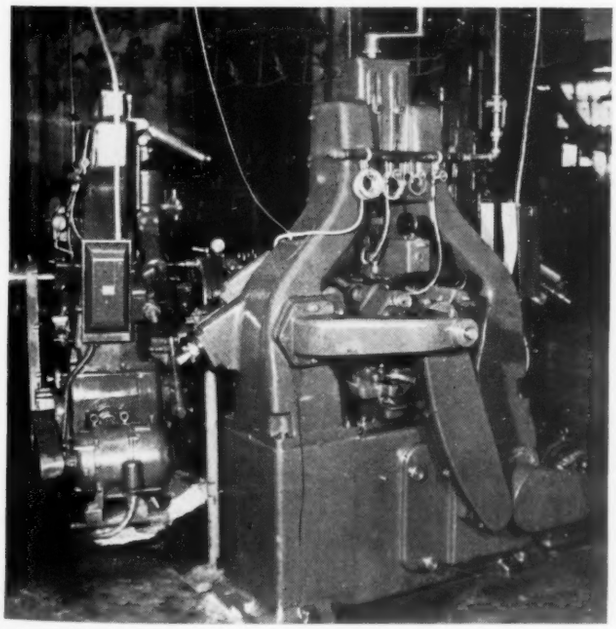


Fig. 3—The final operation in finishing transmission gears is a lapping operation which corrects any small inaccuracies resulting from heat treatment and gives gear teeth a smooth, polished surface

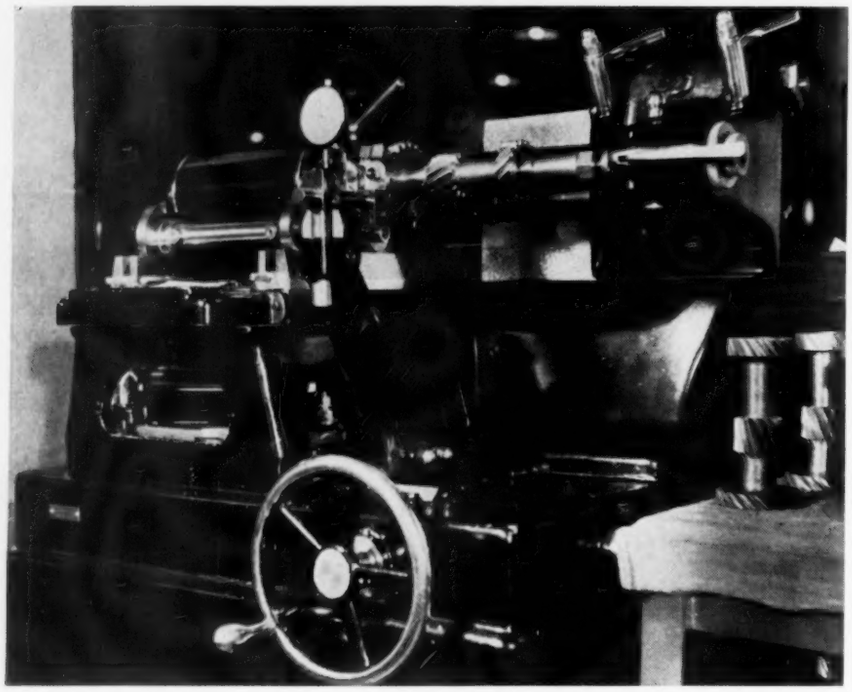


Fig. 5—Lead checking machine with a cluster gear in place, being checked. This machine, operated in a "gear laboratory," provides a check on variations resulting from heat treatment

performed on specialized gear finishing equipment. This equipment not only compensates for heat treat changes, but also controls the manufacturing setup prior to shaving.

Here again the gears are mounted on arbors to duplicate their position in the transmission, and are allowed to roll back and forth on a reciprocating cutting rack, which "shaves" the gear teeth to the desired form. There are separate machines and racks, of course, for the various gears which are used on the countershaft cluster.

Buick gets about 25,000 to 30,000 gears per re-sharpening of the rack. Use of the gear shaver makes it possible to hob the gears in one operation, separate roughing and finishing cuts not being required except on the center (low speed) gear of the countershaft cluster. The latter is a fairly wide gear having a high (25-degree) pressure angle and a 20-degree helix, and is both rough and finish hobbed.

Costs Reduced 20 Per Cent

Tolerance variations permissible by the use of gear shavers following hobbing made it possible to get just as many gears per hob re-sharpen as if rough and finish operations were used. Furthermore, with the gear shavers in the line, class B ground hobs were found satisfactory, thereby reducing hob costs by roughly 20 per cent. It might be mentioned here, though, that every time there is a machine or hob change, or hob-reset, gears are routed through a "gear checking laboratory" for complete checking of tooth form, etc. The type of equipment used is illustrated in Fig. 5.

In hobbing, gears are of course also located from centers. Low speed and reverse gears are hobbed in pairs, back to back as shown in Fig. 6, virtually doubling productivity. While the idler gear also has a 25-degree pressure angle and 20-degree helix angle, the comparatively narrower face makes it permissible to finish hob this gear in one operation.

Machining operations prior to hobbing are designed to make recentering unnecessary, except as a safeguard. Major operations might be cited, as an example, for the drive gear — which requires the closest control of all transmission gears, since any errors will multiply themselves in the transmission assembly through the gear train.

After centering, the blanks are rough and finish turned separately on automatic lathes with multiple tooling, the blank being mounted on centers and driven with a self-centering chuck. Finishing of the rear gear face, cutting to length and semifinishing of bearing diameters are performed subsequently on automatics, to eliminate chances of error due to rechucking and the like.

Recentering Corrects Errors

On the drive gear, there is a recentering operation after this, which is in the form of a chamfer in the drilled ends of the piece, to correct for any errors introduced, possibly, by the machine itself.

The same facing operation on the hollow gears is performed with the gears driven on 0.001-inch tight fit arbors forming part of the machine fixtures. Other turning operations, on lathes, are performed by locating and driving with expanding centers in the bores.

Oil holes are drilled following finish turning, with such holes drilled adjacent to the gear cylinders, rather than through them. In this manner drilled holes through gear teeth are avoided. These might cause tooth distortion in heat treatment. Threads on the drive gear are cut on thread millers, using driving centers for accurate locating, again.

Other interesting gear operations include the cutting of internal grooves in the cluster gear to prevent bushing slip; cutting of internal clutch teeth with a helical lead on

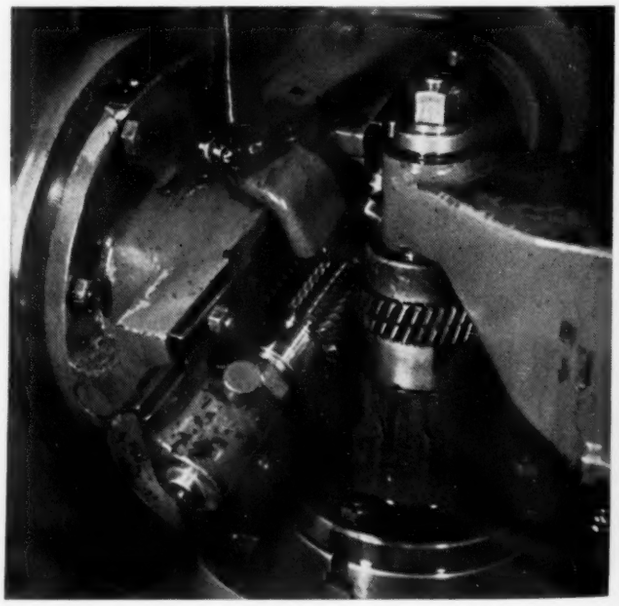


Fig. 6 — Machine for hobbing two low speed gears at one time, back to back. Gears are hobbed in one operation, as a result of adoption of the shaving process shown in Fig. 4

gear shapers, locating from the face of the gear blank (which is true with the far center); broaching of internal involute splines; and the cutting of shifter fork grooves on lathes with cemented tungsten carbide tools.

Clutch splines on the drive gear are hobbed on a group of the newest type machines for this work. Following heat treat, bores and bearing seats are finished by grinding, the former of course, with an internal grinder, but locating from the gear pitch line diameter. The bore of the second speed gear is honed for maximum accuracy. After assembly of bushings in the cluster and idler gears, these bushings are diamond bored, as shown in Fig. 7.

Gear blanks after upset forging are all annealed, normalized and pickled.

It will be noted, therefore, that throughout the entire manufacturing setup and for each manufacturing stage, accuracy and uniformity are provided. It might be said, even, that uniformity for each step in the gear production process is the most important since if even slight errors are introduced, such errors will be uniform in character, and can be and are corrected with the gear shaving equipment.

The manufacturing process built around this equipment therefore has resulted in highly accurate and uniform gears. Contributing to this is that the process makes possible a minimum of stock removal, eliminating distortion resulting from excessive machining away of material.

Fig. 7—Diamond boring operation on the idler gear bore. Accurate finishing of bores is essential to quiet operation of gears

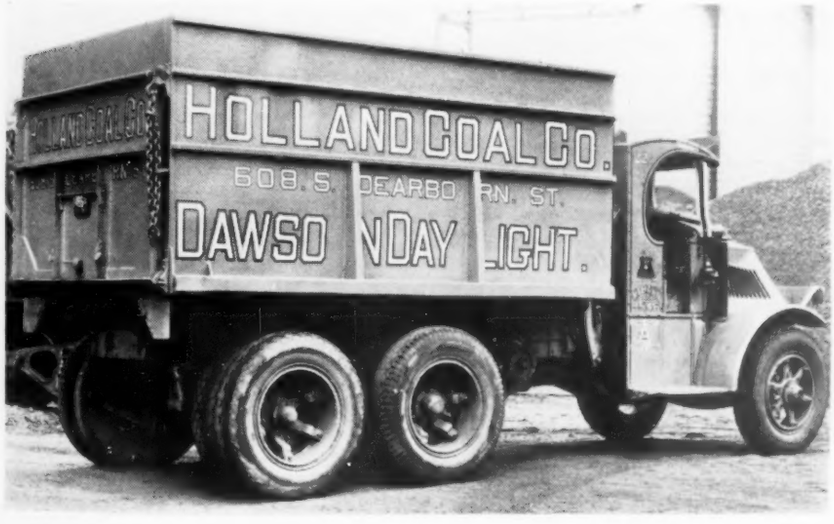
Arc Welded High-Tensile Steel for Truck Body Cuts Weight a Third

USING high-tensile steel and arc welded construction in the fabrication of a body for a coal truck, the Heil Co., Milwaukee, recently effected a reduction in weight from about 5000 pounds to 3375 pounds and a corresponding increase in pay load. The truck body, shown in the accompanying illustration, is 12 feet 6 inches long, 7 feet wide and 5 feet 3 inches wide, and has a capacity of 12 tons.

Through the use of high-tensile steel, in this case RDS steel produced by the Republic Steel Corp., Youngstown, O., the same strength and carrying capacity of 8-gage mild steel was obtained with 12-gage metal. This steel has a tensile strength of 90,000 to 100,000 pounds per square inch and a ductility of 25 per cent elongation in 2 inches.

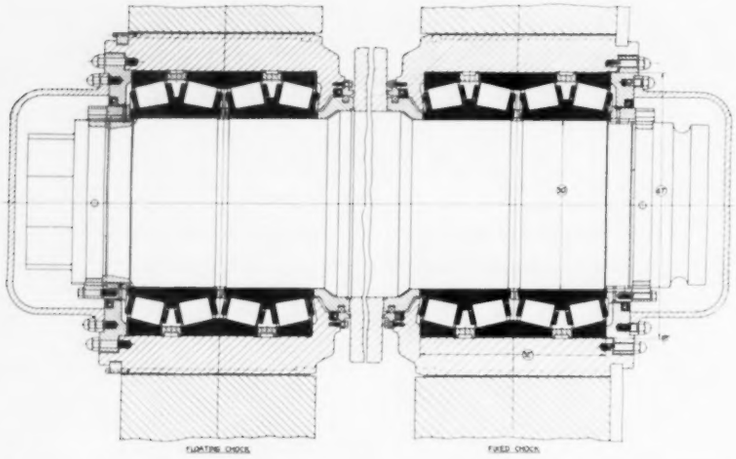
In construction, the subframe and shell were welded up as separate units, then welded together. The subframe consists of 4-inch cross members welded integral with 5-inch longitudinal members. The shell of the body, built of 12-gage steel plates, has its own framework which consists of sections of channels and angles as longitudinal and vertical members. These members are welded to the outside of the shell plating to provide ample rigidity.

Welding was done with shielded arc equipment supplied by the Lincoln Electric Co., Cleveland.



New Brake Microgage

In co-operation with the engineers of the Studebaker Corp., South Bend, Ind., the Frisz Mfg. Corp., Indianapolis, has designed and soon will have in production a new model brake microgage for commercial cars and trucks including those of full floating type. This is a precision tool for determining whether the brake shoe contacts with the full surface of the drum when the brake is applied. It detects and determines the bend in rear axles and front spindles, if any. The new microgage will be distributed by the Wagner Electric Corp., St. Louis.



Back-up rolls for a 4-high reversing cold mill showing arrangement of the roller bearings

Roller Bearings Important In Precision Rolling Mills

BY S. M. WECKSTEIN
Timken Roller Bearing Co.

THE past ten years have brought about numerous developments in the art of rolling metals. The outstanding achievement has been the progress in rolling of thin wide sections in continuous strip and sheet mills.

THE accompanying article is abridged from a paper presented May 23 at the general meeting of the American Iron and Steel institute in New York. The author, S. M. Weckstein, is assistant chief engineer, Timken Roller Bearing Co., Canton, O.

Ten years ago, progress in rolling strip steel practically had stopped. Existing mills were able to roll hot strip up to about 24 inches wide by 12 gage. Narrower widths were obtainable as thin as 16 or 18 gage. Strips of thin gages wider than 24 inches could be produced only at great sacrifice to length of coil, considerable increase in power and decreased output.

To roll wider strips, it was necessary to increase roll diameters and an inevitable increase in rolling load, due to increased arc of contact between rolls and strip, was the result. This further increased roll-neck friction with consequent greater power consumption. The only solution was to design a mill with relatively small working-roll diameters which was stiff enough to permit rolling strip within commercial tolerances. Use of backing-rolls appeared to be the only solution.

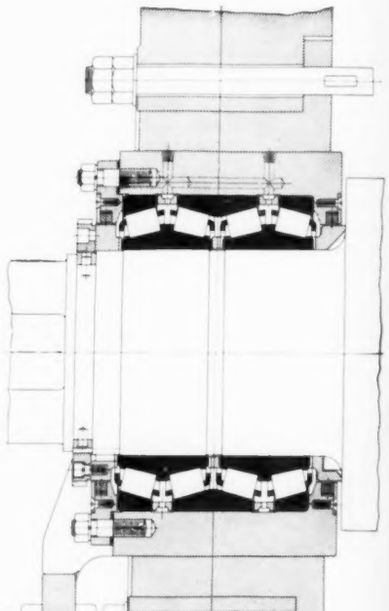
The 4-high mill tried out in rolling wide plates offered best possibilities. Since power cost is important in rolling thin material, use of roller bearings became of prime importance. This type of bearing was also a great factor in elimination of excessive heating at the high delivery speeds and, of course, reduced so-called bearing wear to an almost infinitesimal figure. In rolling thick material, this wear was not of prime importance but it did become vital in rolling material of 16 or 18 gage. Accordingly, roller bearing manufacturers in co-operation with mill builders conducted tests which dictated the design of proper bearings.

Bearings Determine Roll Size

The roller bearing operates practically without heat or wear and is particularly adapted to high speeds. Since any suitable ratio of roll diameters may be used in the 4-high mill, it can be built around the proper bearings. In other words, roller bearings of ample load-carrying capacity establish roll sizes. This is definite departure from the principle that roll sizes determine bearing sizes.

Coming back to the ratio of roll diameters in 4-high mills, it is important to point out the following factors. Increasing diameters increases rolling pressures and consequently increases neck-friction. Friction loss in roller bearings is extremely small. Power savings of 50 per cent and over have been recorded. Consequently, larger working-roll diameters, capable of withstanding greater stresses, can be used with almost no effect on total power consumption.

For cold-rolling wide strip, the 4-high mill was of even greater importance. Strip of 16 or 18 gage is reduced to 30 or 32 gage and rolling loads are greater than in hot rolling. Such reductions are being made on continuous or reversing mills with delivery speeds of 800 feet per minute. The accuracy of rolling with these mills is remarkable. On hot-mills rolling wide strip it is not uncommon to roll with variations in thickness of less than 0.002-inch from edge to center and from end to end. Four-high mills rolling thin gage material must be classed as precision mills. Measurements of thousandths of an inch are dealt with and the equipment must be made accordingly. Trained crews must be employed to obtain desired results.



A typical roller bearing roll mounting. Above the center line is shown the floating end of the top or bottom roll; below is shown the fixed end

The metal must be watched carefully in the early stages of rolling. To guide long strips properly, they must be rolled with a slight fullness in the center. The guides are of importance only to insure that the path of successive pieces is on the same part of the roll. Control of strip in the mill is accomplished almost entirely by adjustment and shaping of the rolls.

Turned rolls cannot be used sat-

isfactorily in strip mills; the rolls must be ground with extreme accuracy. Whether they should be ground concave or full is dependent on the stiffness of the mill and is based on careful judgment and experience. The shape of a roll in the grinder is not the same as when rolling steel. When rolling, the roll flattens and bends no matter how stiff it is. If both backing and working rolls are ground straight, the mill will deliver a strip full in the center. The amount of fullness will depend on reduction, width and shape of the entering strip. Increasing the load will change the shape of the rolls and strip.

In cold-rolling, and occasionally in hot-rolling, local application of heat is employed to shape the rolls. Properly directed gas flames or streams of hot compounded oils are applied to back-up rolls.

Keep Tab on Pressures

Shaping rolls by increasing the rolling load presents a serious problem from the standpoint of bearing life. Bearings are designed to give a desired expected life under given rolling loads. A continuous slight increase in loads results in a considerable decrease in bearing life. For this reason, to protect bearing life, it is recommended that pressure recording instruments be incorporated in all 4-high stands, especially in cold-mills. In this way, reductions per pass can be balanced properly so that additional loads imposed by the screws for the shaping of the rolls will not make the total load greater than the recommended separating force of the mill.

While attention was focused on precision products from 4-high mills, little development work was done on bar and rod mills Introduction of knee-action springs on automobiles, created immediate demand for precision rounds. Prevailing commercial standard tolerances were not satisfactory and the hot-rolled product could not be used without cold-drawing to size.

Some mills tackled this problem and after experimentation offered a hot-rolled product held to one-half standard tolerances. One mill could roll to even closer tolerances but accepted orders only on the basis of one-half prevailing standard tolerances. The foregoing results were made possible by suitable mill arrangement, proper mill practice and proper equipment. Mill arrangement depends entirely on range of products, size of orders, diversity of orders and size of plant. The continuous mill and the semicontinuous mill are the two general types to be considered.

The continuous mill has the advantage of low first cost and low operating cost. It is adapted to rolling large tonnages of narrow strip, skelp, flats, angles and merchant bars. It is justified in large steel plants where tonnage requirements are large and range of products limited, but is not suited to the average merchant bar plant.

In rolling strip, the product must be accurate to gage and width. Mill rolls can be set beforehand and roll speed controlled to maintain proper loops between stands. Adjustment for gage can be made in the last few stands; width can be maintained by edging rolls.

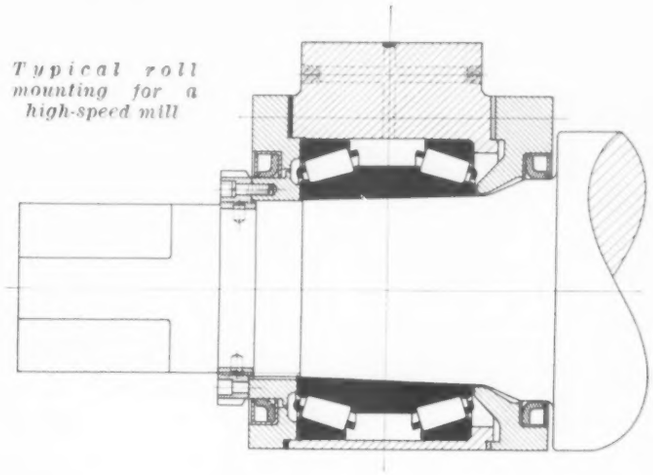
In rolling rounds, it is a different problem. Delivery of an accurate round from the finishing stand is dependent upon the delivery of an exact section from the next preceding stand and this section is in turn dependent upon delivery of an accurate section from preceding stands. In other words, accuracy of finished product is a function, not alone of the finishing pass, but of each preceding pass. To assure this accuracy, considerable skill is required in adjusting sections of the various roll stands. Since the product of section area and delivery speed must be constant for all stands, it can be seen that an adjustment in section in any stand must be accompanied by corresponding adjustment in roll speed.

The semicontinuous mill is more suited to production of high-quality products. It is easily adapted to rolling specialties and jobbing orders of small tonnages. These mills usually are arranged with several roughing stands for continuous rolling; intermediate and finishing stands are arranged to permit the product to run free after each pass. Thus, intermediate and finishing stands are independent of each other as far as speed is concerned. Passes can then be adjusted individually to give desired accuracy.

Proper mill practice and mill equipment are important and govern the accuracy of the product. Attention must be given to proper heating of billets, control of temperature during rolling, control of scale, elimination of undue stretching and twisting of material during rolling, efficient handling and rolling after the product leaves the mill, and roll design and roll mounting.

It is important that billets be heated uniformly; temperature should not vary from billet to billet. Even more important, temperature in different parts of the same billet should be uniform; varying temperatures will result in different finished sections. Rolling and heating schedules must be arranged to assure a continuity of flow of billets from the furnace through the mill. All billets should be heated for the same length of time and should take exactly the same length of time to pass through all stands.

In the continuous mill, temperature during rolling cannot be controlled readily and will depend entirely on the temperature of the billet leaving the furnace. This means that all billets leaving the furnace must be of the same temperature. In the semicontinuous mill, the bar or rod may be delayed on the transfer tables and thus the same desired finishing temperature obtained.



Typical roll mounting for a high-speed mill

Other Precautions Required

Undue stretching and twisting of material during rolling must be avoided. Entry guide-boxes must be designed to enter and hold the bar or rod in a definite position relative to the groove in the roll. Delivery guide-boxes and twisters must be equally accurate and of proper design to minimize the severity of the twist and not restrain the free passage of the material. Adjustable guide-boxes may be used if their design assures permanency and accuracy of adjustment.

Accuracy of finished product depends on the grooving and necking of the rolls. Often, little attention is paid to the necking operation. Turning and grooving roll bodies is done from the necks and the accuracy obtained depends on accuracy of the necking. The necks should be concentric with the body and all faces should be ac-

(*Please turn to Page* 60)

METHODS AND MATERIALS

Insulating Pipes To Stop Sweating

IN MANY industrial plants and office buildings it is necessary to run cold water pipes through warm rooms, with the result that condensation takes place on the pipes to cause constant drippage of water on the floor. This not only produces a wet, undesirable condition, but also brings about a hazardous condition.

According to the June issue of *Electrical Production*, published by the Electrical League of Cleveland, this condition was particularly pronounced in the turbine rooms of the Cleveland Electric Illuminating Co. The room air being unusually damp produced an excessive amount of condensation on the cold water pipes. To overcome this condition, several types of insulation were tried, but for one reason or another were not found successful.

After some experimentation, the following method was found to be practical. The pipes are first thoroughly cleaned to remove any foreign matter. They are then painted or sprayed with asphaltum. When this coat has dried, another coat is applied. After this coat has been on 24 hours and the asphaltum retains a sticky consistency, ground cork is patted into it by hand.

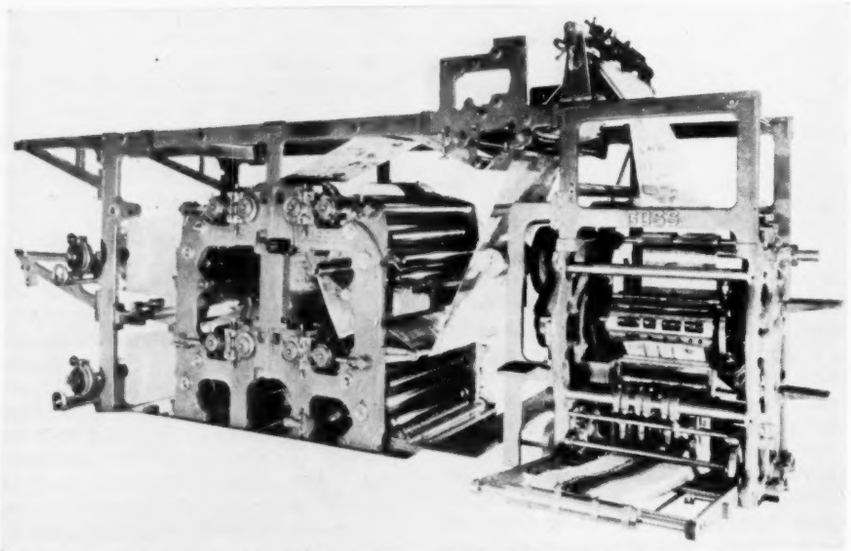
When the first application of ground cork has been completed, another coating of asphaltum is sprayed on. Once the cork has been applied, the asphaltum cannot be brushed on successfully, but must be sprayed on. Again, ground cork is patted into the asphaltum. This process is continued until a sufficient number of coatings of ground cork have been applied. Then a final coating of asphaltum is sprayed on to produce a uniform appearance to the piping.

Experience has shown that three or four layers of the ground cork are sufficient in most places. However, the atmospheric conditions of the room, whether it is excessively damp and the temperature of the water in the cold water pipes, are the factors which must be considered in determining the number of coatings to use.

In addition to overcoming the undesirable wet floor conditions, it has been found that the necessity for replacing pipes has been greatly reduced. Condensation on the water pipes causes rapid rusting due to the oxygen in the moisture in the room air. Insulating the pipes eliminates this rusting.

Another advantage in this method of insulation is that the insulation can be applied to angles, joints, and curves in the pipe as easily as on straight lengths. Any contour of the pipe can be easily and quickly covered. No definite cost figures can be worked out because of varying conditions, however, the cost of insulating by this method is relatively small.

Prints at High Speed



NEW PRESS PRINTS 39,000 TO 40,000 NEWSPAPERS PER HOUR: This new Unitube press, made by Goss Printing Press Co., Chicago, has four complete printing couples, with the units split vertically so that half units may be supplied for 12 or 20-page machines. Antifriction bearings, supplied by Timken Roller Bearing Co., Canton, O., are used throughout. They make possible the high speed and the absence from vibration that results in better printing. For the first time on this type of press, solid forged steel plate cylinders are used. Along with this cylinder a new type of stereo plate, which hugs the cylinder tightly at all points so as to prevent creep, is employed. The complete press weighs 15 tons, mostly cast iron. Bars used in this machine are turned and ground shafting

\$ \$ \$

Train Foundry Apprentices On Efficient Schedule

In a large Pennsylvania foundry working three shifts, apprentices are

divided between the first and second shifts, one commencing at 7 a. m. and the other at 3:30 p. m. The classroom work in connection with the apprentice training course is arranged so that on the days appointed the boys enter the classroom first before they go into the shop. At that time, they are fresh and clean and therefore more in harmony with the surroundings. This method also prevents interruption of the working schedule in the shop.

S S S

George Washington Bridge Cables Being Repainted

Cables and suspender ropes of the George Washington bridge, the largest suspension span in the world, connecting New York City with New Jersey over the Hudson river, are receiving their first coat of paint since the original painting. Close to 1500 gallons of aluminum paint will be required. The repainting of the entire bridge, which will require several painting seasons during the next several years, will require 15,000 gallons. The four bridge cables, each 3 feet in diameter, hold the 3500-foot main span. The suspender ropes, each 2⅞ inches in diameter, are arranged in groups of four at each connecting point with the cables. There are 296 of these groups involving 33 miles of rope.

S S S

Streamline Design Opposed By Machine Tool Builder

Streamlining of machine tools is not recommended by one prominent builder in the Middle West. Here are some of this company's underlying design principles:

Lengthening a shaft unnecessarily to create the impression of mass weakens the machine.

Gears and internal parts should not be made harder to get at for the sake of outside appearance.

Parts that should be seen by the operator should not be enclosed for appearance.

A gear box should not be weakened by increasing its size for the sake of appearance.

S S S

Quality certification of welding rods is being demanded more extensively by consumers. The head of a large Baltimore welding company states it is his belief that variations in welding performance by individual welders are due at least to some extent to variations in the quality of electrodes. He believes that certification of welding rods, under specifications such as those observed by the navy would be of material assistance if applied to the requirements of other buyers.

Fires Clay Testing Furnace With Oxyacetylene Gas

USE of small oxyacetylene furnaces has had a limited application in the field testing of clays for high-temperature refractories, such as are used in the metals and power industries. The good results obtained indicate the possibility of an extension of this method to other testing operations in which high-temperature control is involved.

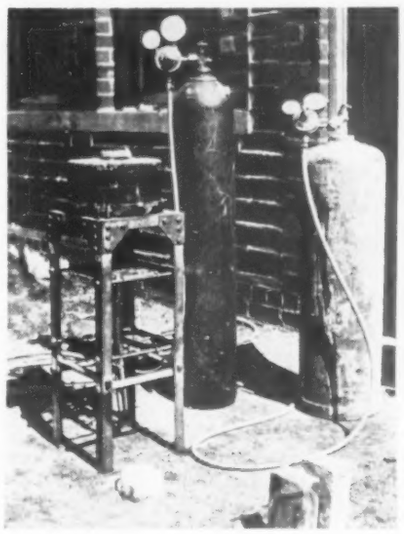


Fig. 1—Oxyacetylene torch furnace for testing firebrick clays

In 1924 the Evens-Howard Firebrick Co., St. Louis, experimented with an oxyacetylene fired furnace for testing fireclay deposits and assisted in equipping this furnace with suitably sized torch. Fig. 1 shows the apparatus developed at that time. The furnace consisted of a steel ring lined with fireclay, having a 3-inch hole in the bottom, at the mouth of which a style 3700 Airco-DB torch (since discontinued) was mounted.

The test samples were ground to pass a 65 mesh screen, molded into standard size triangular based pyramids, and set on a fireclay ring with standard Seger cones between test samples. The ring and samples can be seen on the top of the furnace in Fig. 1. The ring of samples then was placed on the bottom of the furnace, the two firebricks shown in the illustration were placed over the hole in the furnace, and the furnace fired with oxyacetylene from below. Tips Nos. 6 and 7 were found most satisfactory in bringing the furnace to heat within a time interval of 35 to 50 minutes.

A similar application recently was encountered in the mines department of a large steel company. This company had been charged $25 a sample by an independent laboratory for fusion tests, on its fireclays. In order to reduce this expense and to permit of securing a larger number of tests, the furnace shown in Fig. 2 was constructed. This furnace is fired with a style 9800 Airco-DB torch, No. 5 tip, using acetylene at 3 pounds and oxygen at 5 pounds per square inch pressure, controlled by multistage regulators. The combustion gases pass up through a ¾-inch opening into the furnace, impinge on the loosely fitting carborundum cover from which heat is radiated downward on the test samples. The carborundum cover is lifted at intervals to observe the action of the test samples and standard cones, the point of breakdown with reference to one of the standard Seger or Orton cone series being capable of quick and easy determination.

Two typical test specimens, after firing, are shown in Fig. 3. Standard cone 29 has broken down, indicating that a firing temperature above 3000 degrees Fahr,. was obtained.

For certain applications it may be found desirable to fire this type of furnace through holes in the side, using two or three torches equally

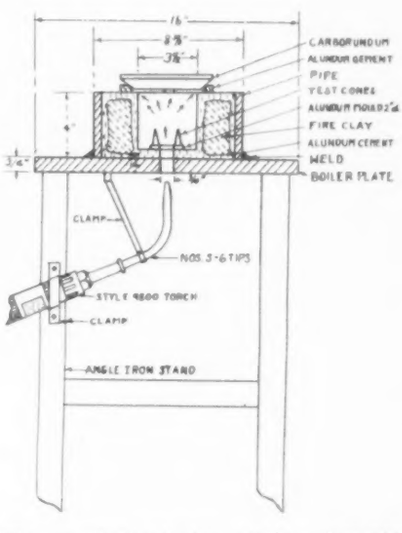


Fig. 2—Refractories testing furnace which uses acetylene at 3 pounds and oxygen at 5 pounds per square inch pressure

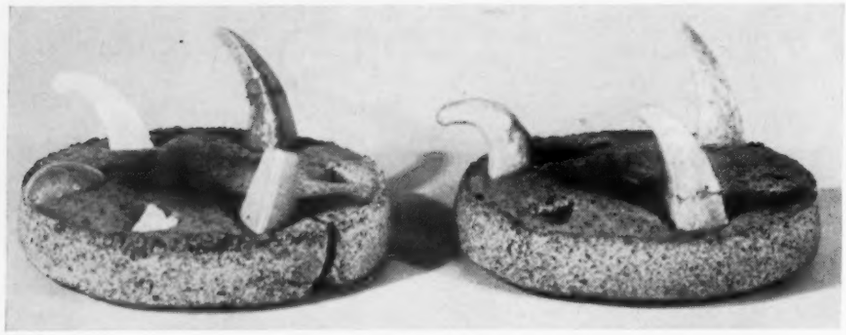


Fig. 3—Typical specimens of fire clays as removed from testing furnace

spaced around the circumference of the furnace.

The fusion testing of fireclays in the oxyacetylene burning furnace approximates the actual service conditions to which the fireclay will be subjected. The easy control of atmosphere with the multistage regulator permits of fusion testing in neutral, oxidizing or reducing atmospheres. The softening point of fireclays is lowered in a reducing atmosphere, and is highest in an oxidizing atmosphere. Comparative tests generally are made with an oxidizing flame, but in many cases information is desired regarding the action of reducing flames on fireclays for use in reducing atmospheres as in blast furnace linings.

Close Control of Heat

A further advantage of the oxyacetylene fired furnace lies in the fine control of the heating possible with multistage regulators. The softening point of a refractory is not strictly defined at any given temperature, but is rather a function of both temperature and time, a test cone breaking down either at a high temperature in a short time, or in a longer time at a lower temperature. An exact temperature measurement at breakdown is valueless without knowledge of the time that the test sample has been subjected to this temperature.

To avoid this difficulty comparative test cones made of varying proportions of alumina and silica are used. In the Seger cone scale, No. 28 consists of 10 parts of silica to 1 part of alumina and melts at 2960 degrees Fahr., No. 40 melts at 3500 degrees Fahr. The rate of heating of the test and standard Seger cones is defined in the A.S.T.M. test No. C-24, and must be followed closely in the actual test. The multistage regulators controlling the oxyacetylene fired furnaces make it possible to meet these requirements, the rate of heating being under fine control.

A final advantage of the oxyacetylene fired furnace lies in the high temperature which can be obtained. All fireclays used in the manufacture of high-temperature refractories can be heated to softening in a controlled atmosphere and under conditions prescribed by standard test code, in an apparatus which is constructed easily and can be moved into the field.

Steel Used for Railway Air Conditioning Parts

Rolled steel plate now is being used in the production of two special fittings used in railway air conditioning units. These fittings are a diverging diffuser and a converging diffuser, both produced by Parish Pressed Steel Co., Reading, Pa. The converging diffuser is shown in the accompanying illustration. Important requirements of the fittings are that the inside surfaces be smooth and the internal dimensions accurate. By stamping these fittings in halves and welding them together, the company has been able to produce them satisfactorily from steel plate without the necessity for machining.

Half sections of the diverging diffuser are blanked, formed and trimmed in a crank press out of 3/16-inch steel plate. These halves are arc welded together, after which the flange, of 13/16-inch steel plate, is welded on. The completed diverging diffuser weighs 25 pounds.

Halves for the converging diffuser are blanked and formed from ¼-inch steel plate and arc welded together. The flange, attached by arc welding, is formed from plates ranging from 13/16-inch to 1 1/16 inches thick. Weight of the converging diffusers ranges from 46 to 50 pounds each, depending on their size.

This converging diffuser, used in a railway air conditioning unit, is formed of steel plate and assembled by arc welding

Meter Regulates Pressures In Resistance Welding

With the right heat, pressure and time, according to *Flashes*, published by the Thomson-Gibb Electric Welding Co., Lynn, Mass., it is hard to make anything but good resistance welds with clean metal. On the other hand, if any one of these three essential resistance welding factors is not properly determined or not properly maintained, the result is almost certain to be a failure.

Just how important this matter of accurate control and maintenance of the welding variables really is can be seen in the rapidly growing practice of using elaborate tube timing devices for accurate control of welding time and precise regulators for accurate control of heat.

Pressure, which is certainly just as important as the two other variables, has not received its full share of attention. Means for applying pressure accurately and controlling it precisely have been available, but there has been no dependable and convenient way to determine which pressure produces the best results under given conditions and no way to make sure that the one best pressure was being maintained. Yet that information is often of the greatest importance. Take, for example, the welding requirements of stainless steel, aluminum and the other nonferrous metals. As a rule, relatively light pressures are required yet there

is a point below which pressures cannot be reduced without danger of burning. In order to stay within the limits that assure good welds on these metals, pressures must be known and maintained.

With a pressure meter manufactured by this company it is possible instantaneously to determine just how much pressure is being applied at the welding points. Once the best pressures for an entire range of work have been determined, the use of this meter makes it easy to set the machine and maintain the correct pressure during production.

Develops Ball Bearings for High Speed Applications

To meet the increasing demand for antifriction bearings to operate at higher speeds, the Norma-Hoffman Bearings Corp., Stamford, Conn., has developed a special type of unit comprised of steel balls and inner and outer rings, but fitted with machined phenolic resin retainers. For certain applications it is found that due to the light weight and accurate balancing of such retainers, less difficulty with lubrication at high speed is experienced than with retainers of pressed steel or bronze. These bearings are being used successfully, with speeds up to 60,000 revolutions per minute in small air-driven grinders and machines for routing out wood and type metal.

S.A.E. Handbook Presents Newly Revised Standards

S. A. E. Handbook, 1935, 696 pages; published by Society of Automotive Engineers, 29 West Thirty-ninth street, New York; price $5.

Results of three important S. A. E. standards projects completed in 1934 are presented in the 1935 handbook, with many other important revisions and additions. Complete revision has been made of iron, steel and nonferrous metals specifications, the previous revision being in 1922. Other new material includes revised tables of screw threads and bolts and nuts established as American standards under sponsorship of the S. A. E. and A. S. M. E.

Booklet Describes Courses

University of Michigan has prepared an attractive 56-page booklet dealing with the courses which it offers in chemical and metallurgical engineering. Copies of the bulletin may be obtained by addressing the department of chemical and metallurgical engineering, University of Michigan, Ann Arbor, Mich.

WELDING, et cetera . . .

BY ROBERT E. KINKEAD

IN THIS column, the author, well-known consulting engineer in welding, is given wide latitude in presenting his views. They do not necessarily coincide with those of the editors of STEEL.

June Bug Endurance Limit

THE welded high-speed train had been designed by the greatest experts in the world. Her sleek sides were streamlined for 120 miles per hour. Every dimension had been calculated and held to the thickness of a hair. All the high officials and politicians were aboard. She headed out of the station on a speed run, hell-bent for nowhere in particular.

The speedometer crept up to 50, to 60, then on up to 85 miles per hour, but there it stopped and never went any higher. June bugs on the windshield and in the heat exchanger put a limit on speed that could not be exceeded. If engineers did not get a good big laugh at themselves once in a while, they would pull boners every time like a New Deal politician.

No Forwarding Address

Our neighbor died and we went to his funeral last Tuesday. These emotional orgies perpetuated on relatives are barbarous. When we go, may some kind friend speak as follows:

"The man who lived in this body is gone. He does not live here any more. He left no forwarding address. He often said that he did not like the house very well—the acoustics were bad, it was hot in summer and cold in the winter. The mystery of life was still a mystery to him when he left. He thought a gathering like this should be like a party of friends exchanging pleasantries at an airport after a mutual friend had departed for a long flight."

Sealing Welds

Two types of electric arc welds require individual analysis every time they are used—the so called "sealing" weld for pressure tightness, and the weld made for mechanical tightness. In both cases the weld is assumed to carry little if any stress. Careful analysis often will show that the weld under these circumstances actually will carry heavy unit stress and will fail prematurely. The safest place for such welds is where two parts are held together by a shrink fit or an expanded fit, as in the case of a plug cooled with dry ice and expanded into a hole. A small weld in such cases is safe but there is also the suspicion that it is unnecessary.

Sparks and Flashes

Welded traveling cranes are specified by many buyers. The banging around this equipment gets in service makes rivets work loose. Loose rivets mean incipient failure. Welded joints stay tight. A welded crane girder costs as much or more than a riveted girder but requires less maintenance. Welded end trucks and trolley frames weigh less and cost less than castings.

• • •

The working stresses in the columns of a mill housing are of the order of 2000 pounds per square inch. The "spring" of the housing must be held to a minimum. If some metallurgist could give us a metal with a modulus of elasticity of 60,000,000, the weight of the housing could be reduced by 50 per cent. That metallurgist could also have ten Rolls-Royce cars and a private yacht.

• • •

Government employes are people. If they can get designs or technical information from private industry, they will immediately start propaganda to have the government do the manufacturing. This is being done on an increasing scale. Unsophisticated manufacturers who imagine they are being patriotic are often being merely suckers.

IMPROVING OPEN-HEARTH FURNACE DESIGN

by William C. Buell Jr.

Chapter II — Part IV

Slag Pockets

CHARACTERISTIC binding steel arrangements for the double and single slag pocket arrangements are offered in Figs. 119 and 120, respectively. The designs vary principally in detail in that the double slag pockets are somewhat wider. Thus it is possible to include a third buckstay at the pit end which is absent in the single design on account of the center wall.

Virtually, no alternates are possible in fundamental slag pocket steel design, and even the detail design will vary but little.

The slag pocket binding begins with a rectangular steel band, the lower tie, LT, which surrounds the slag pocket floor or bottom at the foundation and is securely bolted thereto. These rings, one at each end of the furnace are the anchors of the system, and stability is the prime factor sought. These elements may be constructed of channels or I-beams as may be most convenient and which will permit the easy framing of the buckstay ends.

Involves Four Sets

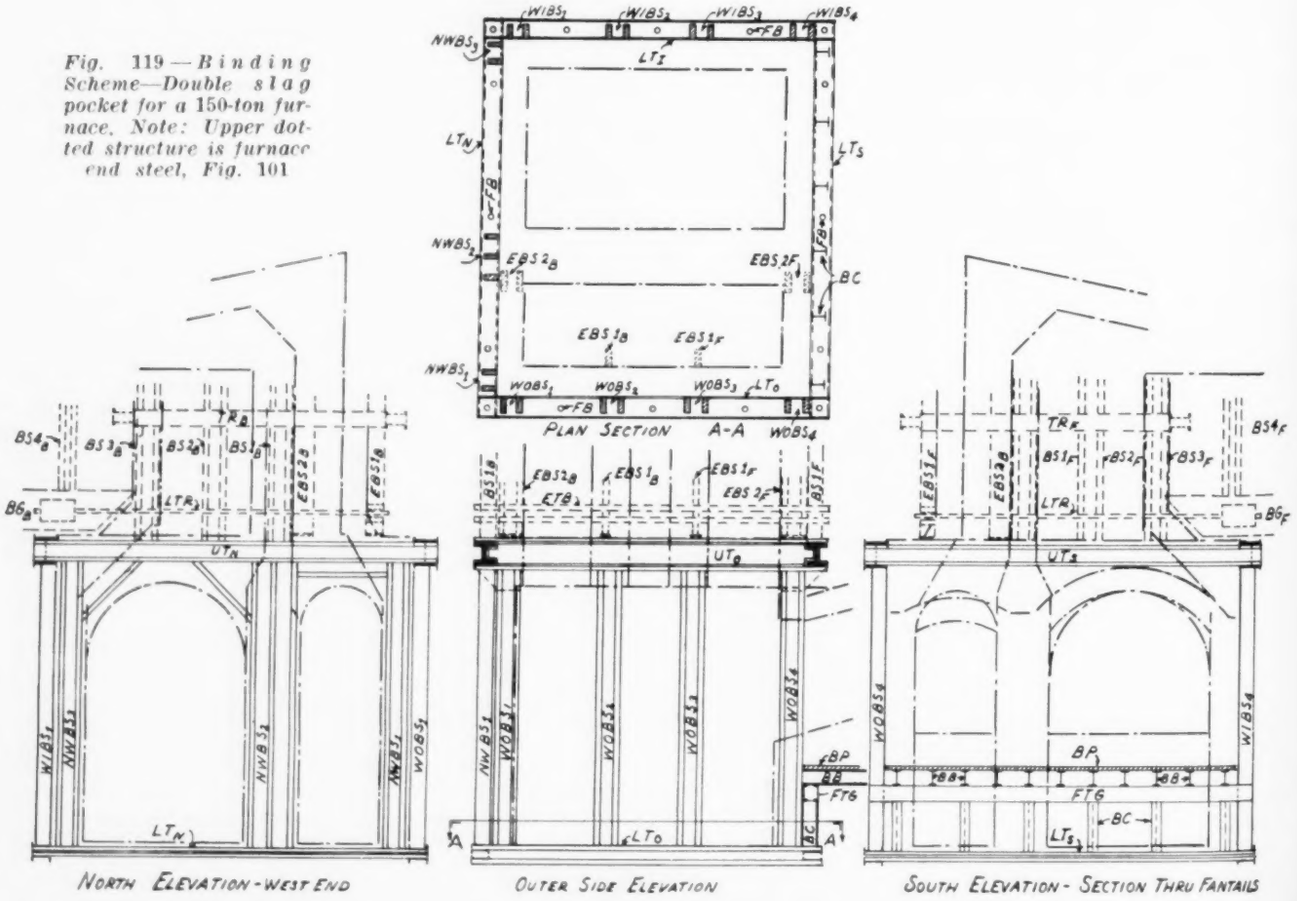
Four sets of buckstays should be provided at each side of any slag pocket with three sets at the front for the double arrangement and two sets for the single arrangement.

On account of the fantail connections it is impossible to include buckstays at the back. The short columns at the back, BC, are framed into the lower tie, and are to support the fantail bottom and steel.

The buckstays are framed into the upper tie, UT, which is composed of four elements, UT_o and UT_i at the side buckstay tops, UT_b at the top of the front buckstays and UT_s which without intermediate support spans the slag pockets above the fantails.

The upper tie, one of the most important elements of the entire furnace steel, must restrain stresses of considerable magnitude from the loadings it will carry; and may be sub-

Fig. 119—Binding Scheme—Double slag pocket for a 150-ton furnace. Note: Upper dotted structure is furnace end steel, Fig. 101



jected to some thermal effects. It, however, should not be expected to restrain forces developed in the brickwork.

Care must be exercised in laying the slag pocket brick in order that its expansion will be absorbed within the brickwork. With slag pockets having perhaps 20 feet of length or width, the accumulated expansion of this length of brickwork, see Fig. 25 (STEEL, Dec. 26, 1933) may be nearly 4 inches. No steelwork incorporating reasonable design can be included or expected to resist the almost infinite expansion forces that are possible of development as a result of poor mason work.

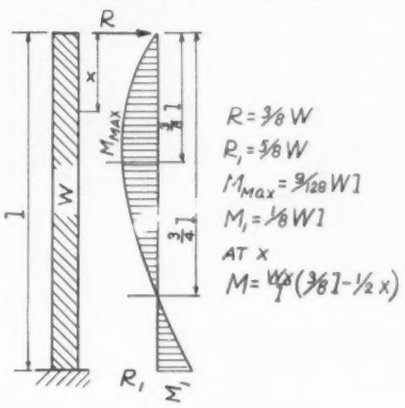
The elements UT_3 and UT_4 will be required to support the front and back buckstays of the upper furnace and their loadings and transmit this superloading through the slag pocket buckstays to the foundation.

The superimposed steel work bearing on the slag pocket structure is shown in dash lines in the drawings.

Desirable design of UT may be hampered by the arrangement of the charging floor beams and possibly by the furnace bottom steel, but no extraneous factor should be allowed to stand in the way of its adequate design.

Several of the principal elements of the slag pocket steel may be solved to allow a better selection of the correct steel sections. These are the side buckstays, the side elements of the upper tie ring, UT_0 and UT_1, and the rear element, UT_3.

Equation No. 48



The diagrams giving the data of dimensions and loadings as well as the bending moment and reaction diagram of the elements chosen for solution as typical members are given in Fig. 121, and these are supplemented by the following explanations:

The double slag pocket binding scheme is first considered. The interior buckstays at the sides, BS_2 and BS_3, will be about 18 feet long and each will support approximately 100 square feet of wall surface. If the maximum outward wall thrust is assumed at 100 pounds per square foot the total loading will be 10,000 pounds. On account of the rigid fastening of the lower tie, LT, the buckstays then may be considered as a simple beam, uniformly loaded, fixed at one end and supported at the other at UT and the reactions and bending moments found through solution by equation (48). The reaction, R = 3750 pounds, will be a force which will in part load UT_0 or UT_1. The reaction at the bottom, R = 6250 pounds, must be restrained by the connection of the buckstay with the lower tie. The maximum bending moment is shown as 270,000 inch-pounds.

In the selection of all primary members of the furnace binding steel the figure of 9000 pounds is used as the maximum allowable fiber stress for rolled steel. This relatively low value has been found consistently satisfactory for high temperature furnace work, it has been used throughout the prior work, and its use will be continued herein.

Thus the appropriate section modulus of a rolled buckstay section will be 30, a nominal value.

Rolled channel sections or I-beams

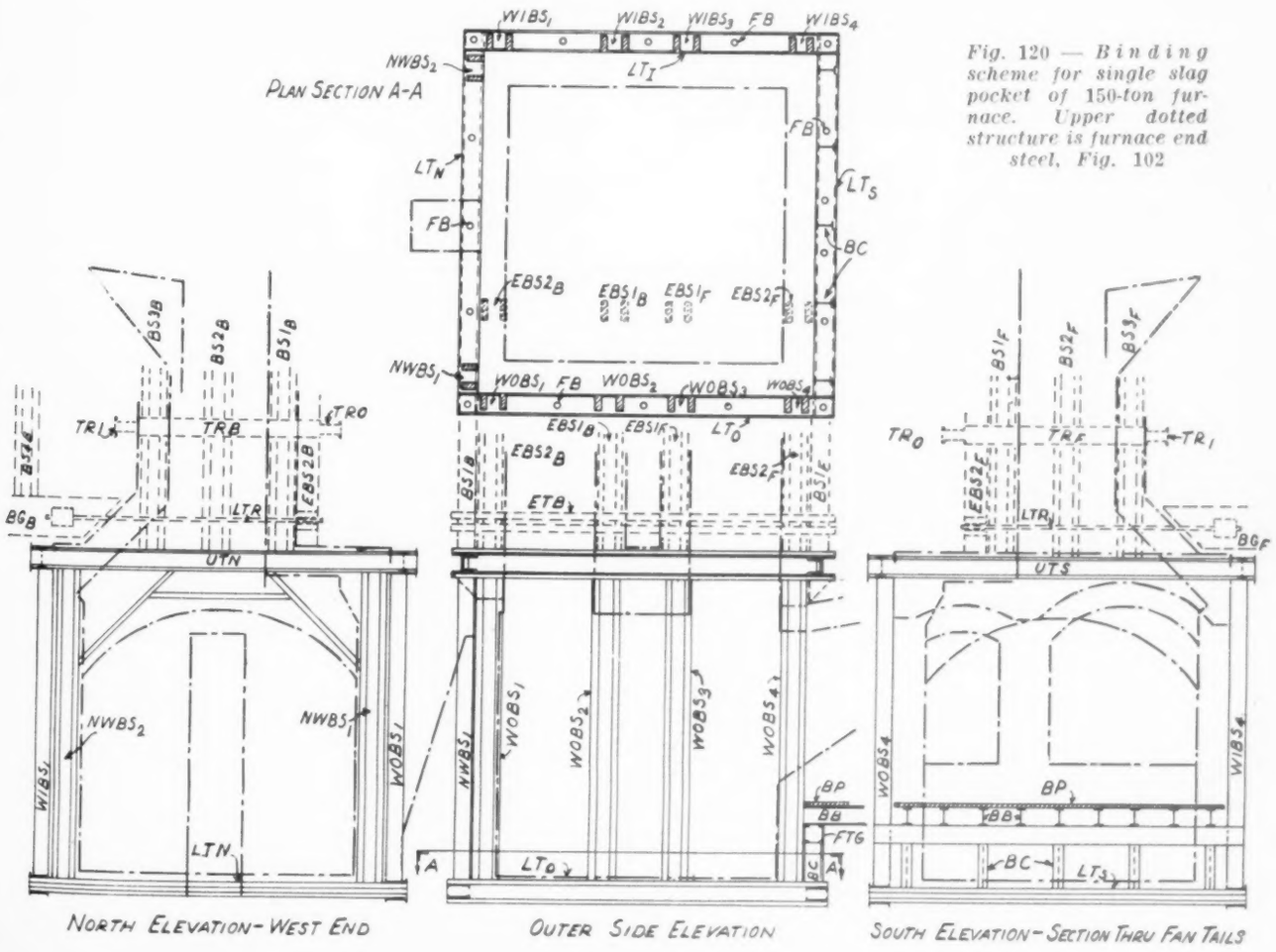


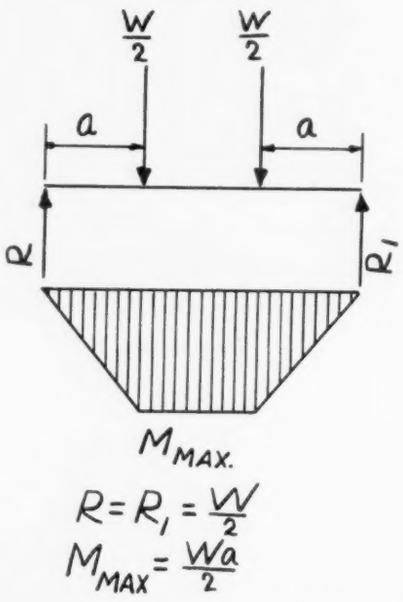
Fig. 120 — Binding scheme for single slag pocket of 150-ton furnace. Upper dotted structure is furnace end steel, Fig. 102

frequently are used for slag pocket buckstays and by inspection of the handbook tables it will be found that two 12-inch 20.7-pound channels with combined section modulus of 42.8 or one 12-inch 31.8-pound I-beam apparently would be suitable. However, the side buckstays, particularly buckstays BS_1 and BS_4 will also be subject to columnar action in supporting UT_3 and UT_4 that will increase the requirements of section modulus somewhat.

Slab members are exceptionally satisfactory for furnace work. Although they weigh much more than channels or I-beams developing the safe section modulus, they are easily rolled in any size in any steel plant at low cost and have much greater resistance to distortion than do the lighter rolled sections, when subject to high or direct heat effects. There are, however, cases in which the slabs do not frame well with the contiguous structure in which case other sections had best be used. The properties and costs of various slab buckstays are given in Table L (STEEL, March 20, 1933).

For an application such as is under discussion the use of buckstays consisting of two 3-inch x 12-inch slabs, which have a combined section modulus of 144, are preferable. This gives a strength four times as great as calculated buckstay requirements.

Equation No. 49



$$R = R_1 = \frac{W}{2}$$

$$M_{MAX} = \frac{Wa}{2}$$

The upper tie element, UT_0 or UT_1, is the beam at the top of the side buckstays that restrains the outward reaction of the buckstays. Its primary loading from the buckstay top reactions will be as shown. The beam is supported at its ends by UT_3 and UT_4 and is taken as 20½ feet long. The simplest solution of the bending moments in this element will be through the use of equation (49) solving twice, once for BS_2 and BS_3 and again for BS_1 and BS_4 and combining the diagrams as shown. The maximum bending moment developed 382,500 inch-pounds requiring a member with a section modulus of 42.5 is nominal and would be found in a 12-inch 40.8-pound I-beam. However, it will be shown that this beam is required to support as a cantilever an end reaction which may be as great as 55,700 pounds from the companion element, UT_5, and consequently the selection of the member will be deferred until all conditions are determined.

The upper tie element, UT_5, is loaded principally by the buckstays at the end of the upper furnace. Reference to the 150-ton furnace diagrams (Fig. 104) will show the loadings at the spacings as delineated. The total span of this beam is taken as 23 feet 4½ inches and it is supported at the ends by upper tie elements, UT_0 and UT_1. Of the loadings indicated in the diagram the first and larger is the weight carried vertically downward by the buckstays corresponding to the symbol used, while the second

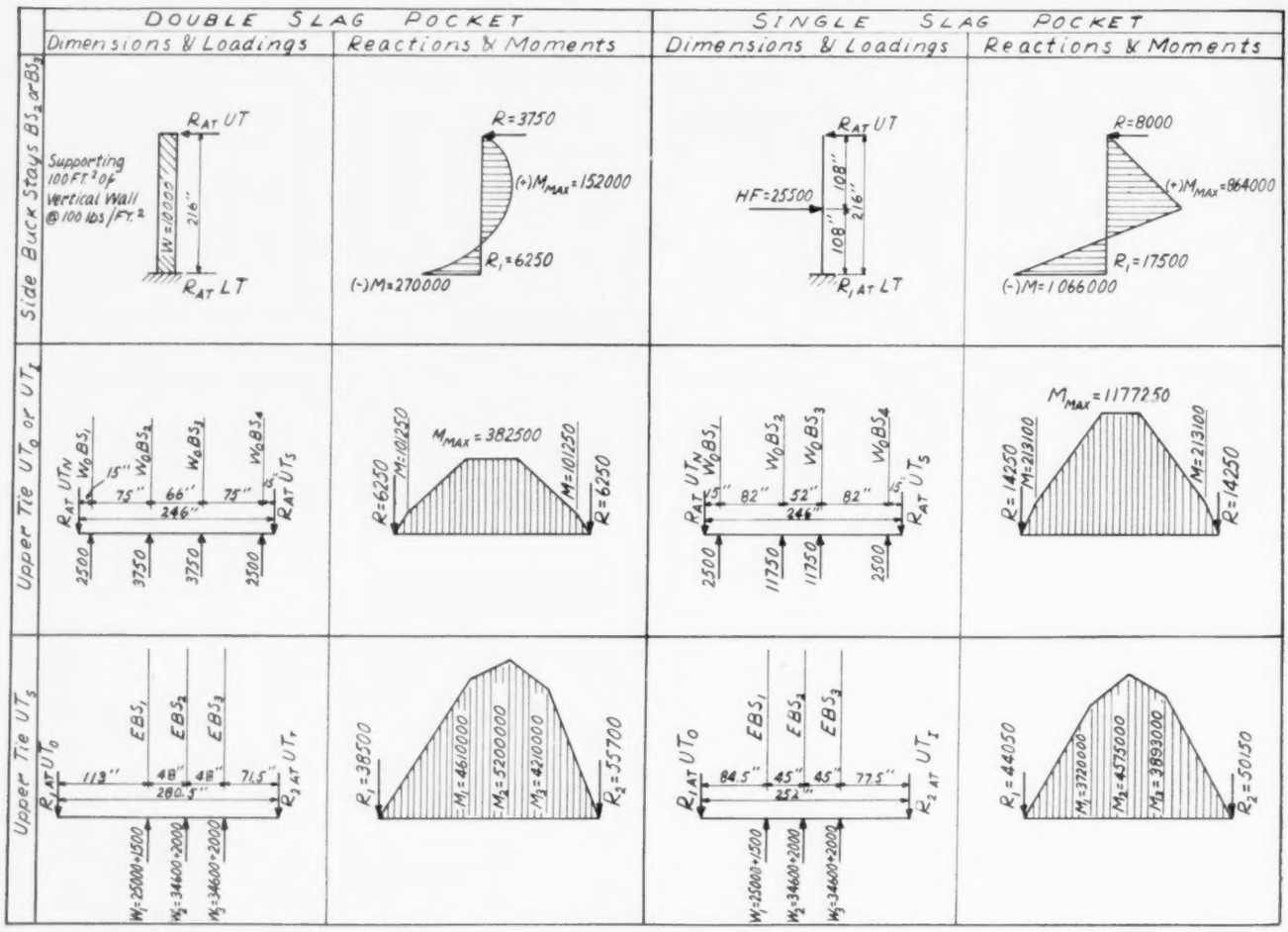


Fig. 121—Principal members of slag pocket binding

Where **COOLING** *is "more important" than* **LUBRICATION**

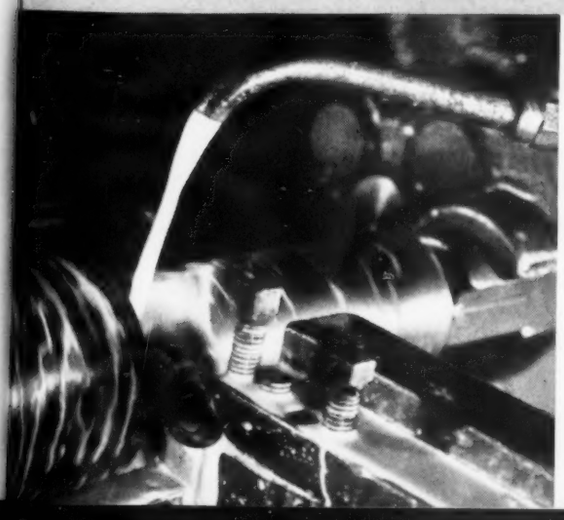
Where cutting fluids are required to act primarily as coolants, economy dictates high percentages of water. The ever-present danger of rust-formation, however, demands careful selection of soluble oils and intelligent control of the oil-water proportions used.

The requirements of correct soluble oils, and the factors which must determine safe oil-water ratios under various conditions, are discussed in a booklet just prepared by engineers of the Standard Oil Company (Indiana). Let the coupon bring this practical booklet to you. Also check any other titles you desire.

Copr. 1935, Standard Oil Co.

CORRECT LUBRICATION

STANDARD OIL COMPANY (INDIANA)



Standard Oil Company (Indiana), 910 S. Michigan Ave., Chicago, Ill. (119)

Gentlemen: Kindly send copies of the papers checked to the undersigned. It is understood that no obligation is implied.

- ☐ "Soluble Oils for Cutting Operations"
- ☐ "Metal Forming Lubricants"
- ☐ "Lubrication in Honing and Lapping Operations"
- ☐ "Quenching and Tempering Oils"
- ☐ "Lubrication in Gear Cutting Operations"

(attach list of any additional subjects in which you are specifically interested.....)

Name ..... *Position* .....

Company .....

Address .....

City ..... *State* .....

and smaller is the horizontal reaction as calculated at bottom of the buckstays.

This element is solved through the use of equation (47) and it will be evident that this beam is loaded heavily. The maximum bending moment 520,000 inch-pounds will necessitate a member with a section modulus of about 580. On account of space limitations a single beam rather than a compound section will better meet the requirements. This would mean such a shape as the Carnegie CB146-370 pound beam being specified.

In existing furnaces this element usually hidden from casual examination by the floor structure is more often found to be greatly deflected and distorted than any other element of the furnace steel leading to the conclusion that the surrounding conditions are not carefully analyzed when designing.

The upper tie at the front, UT_3, is loaded in the same manner as UT_2, but the support from the front buckstays greatly reduces the stresses developed. It probably will be desirable, however, to include beams of the same size at both slag pocket ends.

The foregoing components of the upper tie beam also are called upon to restrain the end reactions of the side elements, UT_0 and UT_1, as previously solved. However, the reactions, 6250 pounds, are insignificant when a beam of the size called for is used so they can be safely ignored.

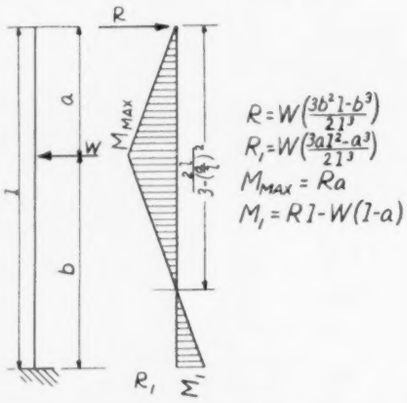
Must Provide Rigidity

The Carnegie beam, or any similar member specified for the upper ties, UT_3 or UT_2, will have a depth of nearly 18 inches. Obviously the end connection of these beams to the elements at the slag pocket sides must be made as securely as possible in order to develop sufficient strength and rigidity in the entire structure. While several other arrangements are possible, side upper ties, UT_0 and UT_1, are conveniently constructed of 18-inch 60-pound I-beams with an 18-inch 45.8-pound channel bolted to each flange and which extends over the flanges of UT_0 and UT_3 to be riveted thereto. While such an arrangement gives much more strength in bending than is required in the restraint of the side buckstays it is ample to carry the cantilevered end loads over the buckstays, BS_1 and BS_4, the end reactions of the beam UT_3 and UT_2.

As a result of the inclusion of a sprung arch in the roof of the single slag pockets, which develops a considerable outward thrust, the loading of the side buckstays is increased considerably over that developed in connection with the inclusion of the semicircular arch. The loading of the buckstays from the roof thrust is determined as follows:

The center arch or roof of the slag

Equation No. 50



pockets carries a part of the weight of the downtake walls which are superimposed on the roof, in addition to its own weight. First, ½W is found (for the arch with 90 or 108-degree included angle) by the use of the chart, Fig. 118. For a 108-degree arch having a 16-foot span and 18-inch brick thickness this will be 1920 pounds per foot of length.

Only that part of the weight of a superimposed masonry wall that is enclosed in a 60-degree triangle, whose sides equal the arch chord is carried on the supporting arch. A chart, Fig. 122, has been prepared through the use of which the added loading from a superimposed structure may be determined for any roof span and 1 foot of length. Thus for

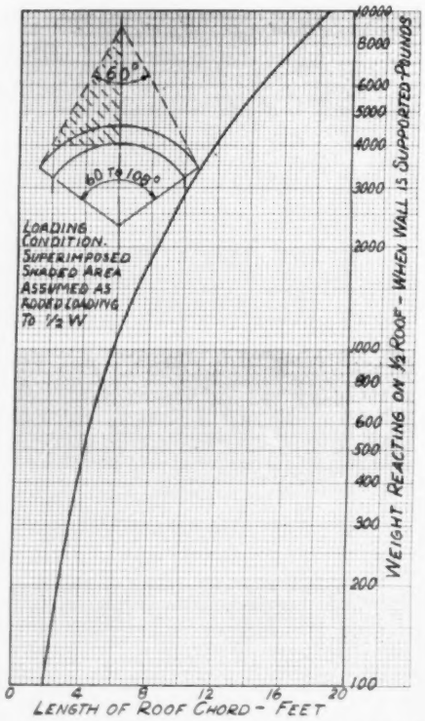


Fig. 122—Chart to determine added arch loading where vertical superimposed wall is supported. For silica or fire brick add 10 per cent to loading values. Values are per wall 1 foot thick

the 16-foot span the loading to be added to ½W is 7300 pounds giving the total weight reacting as 9220 pounds per foot of length.

The length of the center arch is 5½ feet, Fig. 116, and consequently the total weight reacting to be restrained by buckstays BS_2 and BS_3 is about 51,000 pounds total or 25,500 pounds each.

The horizontal thrust developed then is calculated by the use of equation (7) (STEEL, Jan. 9, 1933) as previously described and will be found to be 25,500 pounds.

Equation (50) is used for the determination of the bending moment and the end reactions of the particular condition as previously given and the solution is diagramed in the upper right hand block, Fig. 121.

These buckstays also are subject to the uniform loadings of the walls as previously found for the double slag pocket arrangement and, consequently, the entire loading of the buckstays, BS_2 and BS_3, will be the sum of the two diagrams. Thus the maximum bending moment will be about 1,336,000 inch-pounds and the section modulus of the appropriate steel section about 150. Two 4 x 12-inch slabs, constituting one buckstay, will thus be satisfactory.

The combined reaction at the top of the buckstays, 11,750 pounds each, will form the principal loadings of the upper tie beams, UT_0 and UT_1. These will be solved as before described as well as the elements, UT_3 and UT_2. The stresses developed in the latter are somewhat less than in the prior case due to a shortening of the span of the beams.

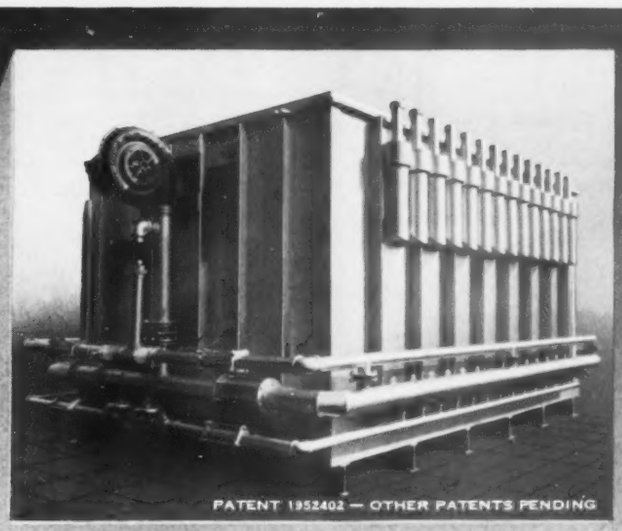
Requires Careful Study

One other item of the principal design should be investigated carefully, the loading of buckstays $W1BS_4$, Fig. 119. This is called upon to carry in columnar effect the end reaction, R_2, which is 55,700 pounds of the upper tie UT_2, the heaviest columnar loading of the slag pocket steel.

The combined area of the 3 x 12-inch slabs recommended as buckstay elements for the double slag pocket design is 72 square inches and, consequently, they will be stressed to the extent of 55,700/72 or about 750 pounds per square inch, an entirely nominal and safe loading.

The length of the buckstays are taken as 216 inches and thus 4.33, the least radius of gyration of the 3 x 12-inch slabs, develops a slenderness ratio, l/r, of about 50 which is entirely in order.

No consideration has been given the strengthening effect of using plate to inclose the side walls or to the stiffening effect of the connection of the slag pocket steel to buckstays BS_4. Both of these will tend to strengthen the slag pocket binding steel considerably and will afford an additional safety factor. Plate for



A PERFECT COMBINATION

The combination of the Wilson Vertical Tube Type Annealing Cover with its Special Inner Cover makes possible a reduction of annealing costs with a shorter annealing cycle.

They are sold exclusively by the Lee Wilson Engineering Co. and The Wean Engineering Co., Inc. No other company has been given the right to manufacture or sell them in the United States or Canada.

The Wilson Annealing Unit is covered by Patent No. 1,952,402 and other Patents Pending.

The

WEAN ENGINEERING

Company · Inc.
Warren, Ohio

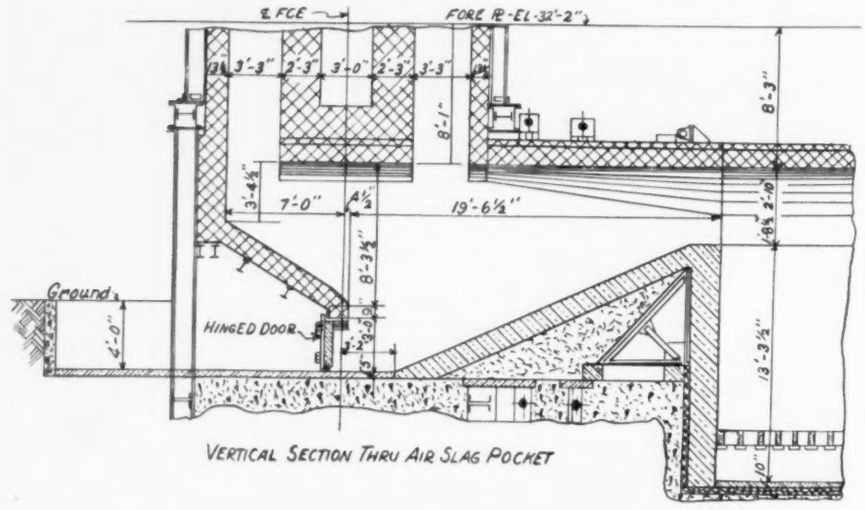
The Wilson Annealing Units sold by us are an exclusive development of

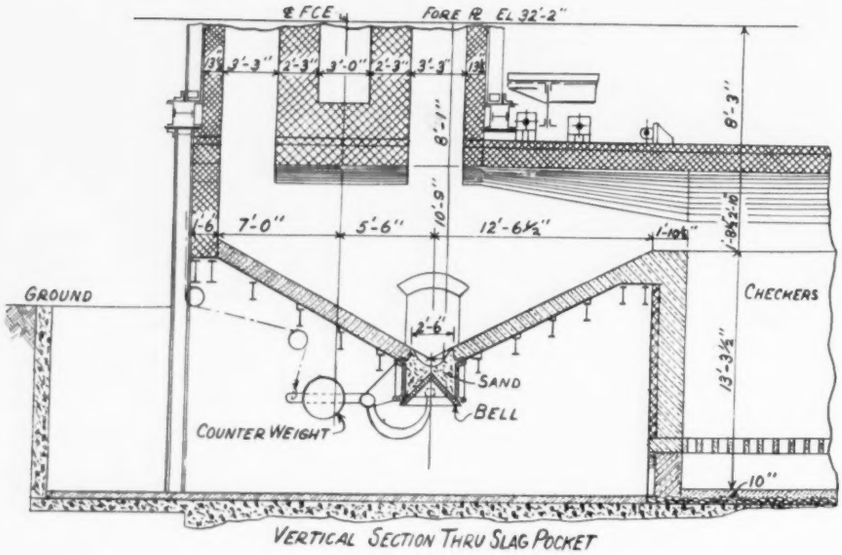
LEE WILSON ENGINEERING COMPANY • CLEVELAND, OHIO

the sidewalls had best be ⅜-inch thick.

While considerable space has been given to the design of steel for the slag pockets, only the more important factors have been discussed, and when designing equal care should be exercised in the selection of the less important elements.

Ample slag pocket dimensions and careful and adequate design of the lines, brickwork and the steel will develop economics that will return attractive dividends throughout the furnace life.





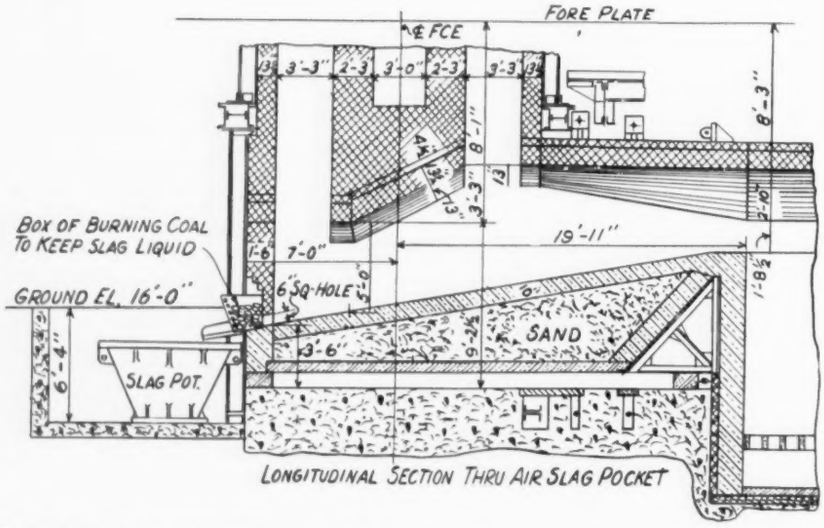


Fig. 123—Slag pocket design to allow the rapid removal of small accumulations between heats. Fig. 124—Slag pocket design to permit the removal of small accumulations between operations. Fig. 125—Arrangement for the continuous draining of the slag pockets

Special Slag Pocket Designs

Accumulation of slag in the pockets is so detrimental to the accomplishment of a prolonged furnace campaign and its displacement so bothersome and costly that many methods of removal have been advanced or tried and a few patented. Some of the ideas have been developed around the continuous removal of the slag while molten, while others would permit access of cleaning bars to the slag pocket during operation for the freeing of the accumulation from the refractories in order that small increments of slag may be removed between heats.

A well known open-hearth operator has offered the three ideas illustrated in Figs. 123, 124 and 125. The first of these would allow slag pockets to be opened between heats and the relatively small accumulation easily removed through the door at the front. The second would allow the periodic removal of slag at any time during the operation by dropping the bell. The third arrangement is to permit the continuous removal of molten slag by gravity flow.

None of these or similar arrangements have proved satisfactory in operation principally because the slag when deposited is not sufficiently fluid to flow readily, but rather is of a sticky, viscous semifluid character that has a property of adhering tenaciously to the brickwork.

Experiments have been conducted with designs similar to those illustrated, and also with the addition of burners to fire into the slag pockets, in order to raise the temperature of the slag to a degree that will permit its free flow. All of these experiments have proved such utter failures as to preclude the hope of ultimate success with methods and designs similar to those illustrated.

(To be Continued)

Correction

In the last paragraph on page 56 of the June 3 issue it was stated that "the charging floor supporting beams must not be of considerable depth," etc. This should have read "the charging floor supporting beams *must be* of considerable depth."

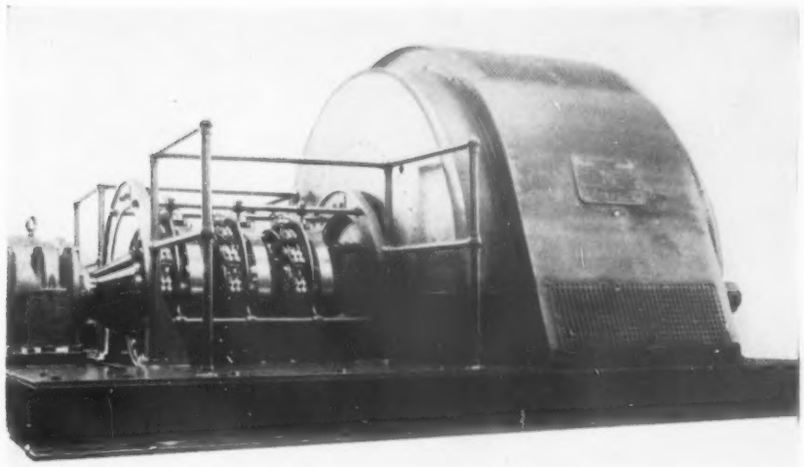
THE EDITORS

It's Up To SKF To

CARRY HEAVY LOADS

In Giant Motors

● SKF makes practically *all types of anti-friction bearings.* When SKF recommends a particular type of bearing, therefore, you may depend upon it; its recommendations are *unbiased!*



One of two of the largest Anti-Friction Bearing Induction Motors in the World
4,000 H.P. at 300 R.P.M.
Built by the General Electric Company
Schenectady, N.Y.
Equipped throughout with SKF Ball and Roller Bearings

It's no soft berth for a bearing . . . this heavy duty motor —no more than it is on shafts of motors that relay power to giant rolling mills and other BIG machines. It's hard work for any bearing, even an SKF.

But SKF has been on tough jobs so long, it knows the qualities that Industry expects to find in a bearing. So it has many types from which to choose, some that answer problems of SPEED, and others that answer problems of LOAD.

SKF saves labor, lubrication, and running costs. It prevents the armature from contacting the field structure, maintains the initial air gap, and enables motors to fit locations smaller than places for motors with longer shafts. It *always* meets your challenge for unquestioned reliability by needing no adjustment and running for long periods on one lubrication.

SKF INDUSTRIES, INC., Front St. & Erie Ave., Philadelphia, Pa.

SKF
BALL AND ROLLER BEARINGS 3393

To Buy or Not To Buy?

W. W. TANGEMAN,

Vice President, Cincinnati Milling Machine Co. and Cincinnati Grinders Inc., Cincinnati,

SAYS:

RECENT surveys indicate machine tool equipment in industrial plants is at least ten years old. Prior to 1930 there was from year to year a gradual reduction in the average age of machine tools, resulting from the installation of new tools. Since 1930, however, replacements of old machines have been reduced materially. Therefore, many plants will enter the coming period of increasing demand with manufacturing equipment inadequate to meet the intensive competition for high quality and low cost which inevitably accompanies a revival in business.

Look to Efficiency!

This is the time we should all examine carefully the effectiveness and efficiency of every piece of machine tool equipment. There are definite factors which must be considered if we are to make an intelligent and thorough analysis of the machine tool equipment problem.

First, the components of our own product which we are called upon to make today and which must be manufactured in the future, necessarily have to be machined to closer tolerances than heretofore.

Second, this high degree of accuracy must be attained with workmen of no higher average skill than those previously employed. In fact, the present outlook indicates working forces must be supplemented with many unskilled and inexperienced men.

Third, the cost of machining operations must be materially reduced in order to compensate for inevitable increases in costs in other directions.

We all know that that the automobiles, airplanes, refrigerators and electrical apparatus of today represent tremendous advances in design, in operation, in durability and in reliability. These improvements are primarily due to a tightening up of machining limits, improved quality of workmanship and material, and to the more general application of standardization of parts and tolerances.

No one will contest the statement that products of high quality and greater accuracy can be produced more readily on new machine tools than on old. New machine tools and new machining methods have contributed largely to the improved quality of consumer goods of today and at the same time have made possible reduced selling prices by lowering costs.

Boon to "Average" Workman

While we have in America a large number of highly skilled craftsmen unequaled in any country in the world, there are not enough of these men to produce the quantities of quality products which the American standard of living demands. Modern machining processes and modern machine tools make it possible for the "average" workman consistently to produce parts to extreme limits of accuracy. Modern machines are more foolproof in operation, and it is possible today to select machines for almost any manufacturing operation, the manipulation of which can be learned in a short time.

An important though intangible by-product of the installation of new machinery is a vast improvement of the morale of the workmen. An

" . . . . New machine tools and new machining methods have contributed largely to the improved quality of consumer goods of today and at the same time have made possible reduced selling prices by lowering costs," states Mr. Tangeman in his contribution to STEEL'S series of articles dealing with advantages of replacing machine tool equipment in industrial plants with improved, modern designs. This is the fifth installment in the series, appearing weekly and leading up to the third National Machine Tool exposition in Cleveland, Sept. 11-21.

interesting example came to the writer's attention a few days ago. A large motor car company placed a few new machines in a department that had not had any new equipment for a number of years. The effect of the new machines on the men and their supervisors was almost magical. By contrast, the old machinery looked out of place. It was immediately cleaned up, repaired, and repainted to make it more suitable company for the new machines. The whole department was rejuvenated. This is a perfectly natural reaction, and similar advantages can be gained in most shops by following this procedure.

Doing the Impossible

We can see evidences on all sides of increases in costs of manufacture. Many of the factors tending to increase cost are beyond our control. However, we owe it to our companies to see that overall machining costs as well as assembly costs compare favorably with those made possible by the use of new methods and up-to-date machine tools. The machining art has progressed rapidly during the past few years. Many things are possible today which were not thought of five years ago.

As manufacturers of milling, grinding, lapping and broaching machines, innumerable cases have come to our attention which prove that cost reduction and quality improvements have resulted directly from the installation of new and improved machines. In one case, a careful analysis by a specialist resulted in cutting in half the cost of milling three lugs on a clutch plate for a popular priced automobile. Close tolerances were obtained because the three surfaces all were machined in one setting. A standard production milling machine was equipped with auxiliary spindles in order to accomplish the desired result. A careful investment analysis shows clearly the cost of the equipment will be paid for within one year and at the end of this time the user will have a valuable standard machine available for other work in case the part design changes.

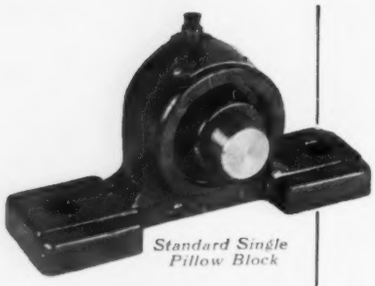
Dividends in Performance

Not all users of machine tools can be classified as high production manufacturers. However, most of us have milling machines in our toolrooms or in our various manufacturing departments. The new type of general purpose knee and column millers will, in most cases, pay handsome returns, give increased output and provide lower costs than many existing installations of older models. The new machines are more substantial and heavier cuts can be taken. They provide higher spindle speeds and greater table feeds, utilizing the new high-speed cutting alloys. They are more accurate and dependable, and they are much easier to set up and manipulate.

The mere substitution of a new type milling machine for an old one enables toolmakers and milling machine operators to produce better work in considerably less time.

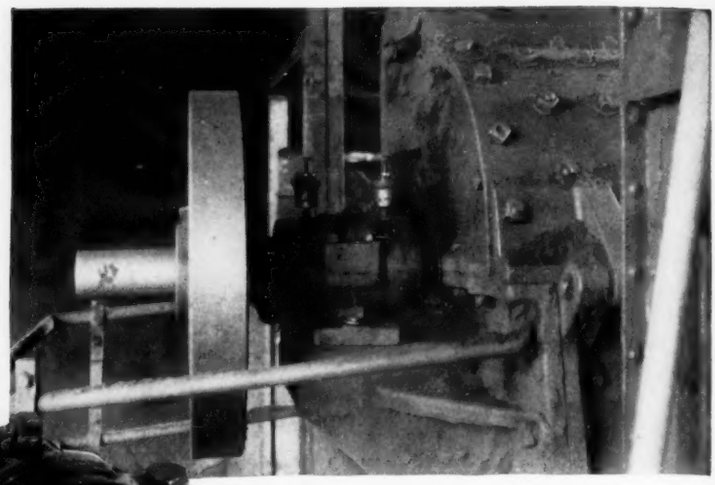
Surface broaching has taken its place today as an important method of machining high production parts. Sufficient basic information as a result of experience and experiment

(*Please turn to Page 60*)



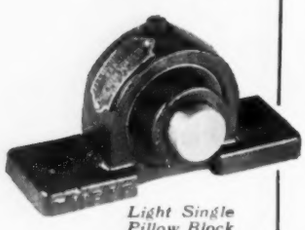
Standard Single Pillow Block

Standard Double Pillow Block with Double Seals



Standard Double Pillow Block

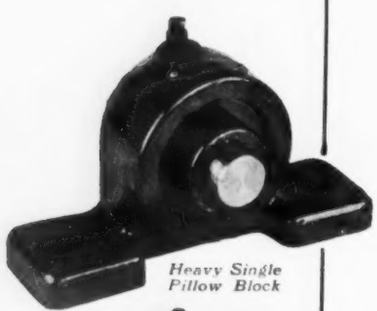
Where DUST *and* DIRT *Prevail*– *Fafnirs Stand the Gaff*



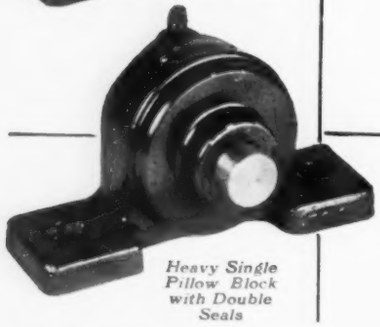
Light Single Pillow Block

To pulverize the dried sludge left after the solid matter has been separated from the greases in the garbage, a Williams Crusher is used in this city garbage disposal plant. Operating 7 to 10 hours a day, six days a week, this crusher is forced to take unusual punishment because of the dirt which accumulates. Fafnir Pillow Blocks have given excellent service even though the bearings are usually covered with fertilizer made from the sludge. The standard Fafnir dust seals, consisting of two overlapping pressed steel caps, insure this dependable service as they provide a trap which effectively retains the grease and just as effectively excludes all dirt.

Whether or not the job at hand requires the exclusion of dirt, there is a correct Fafnir for every service. With the "most complete line of ball bearings in America" Fafnir is equipped to recommend the exact bearing for every industrial need. Fafnir engineers will be glad to help you select the bearing best suited to *your* needs . . . THE FAFNIR BEARING COMPANY, *New Britain, Connecticut* . . . Atlanta . . . Chicago . . . Cleveland . . . Dallas . . . Detroit . . . Milwaukee . . . Minneapolis . . . New York . . . Philadelphia.



Heavy Single Pillow Block

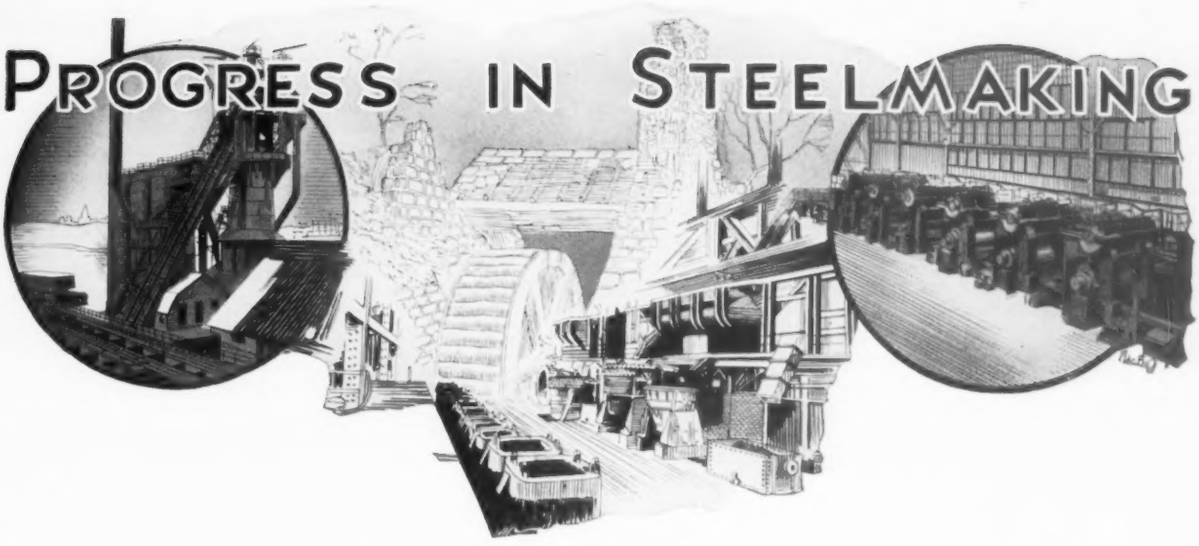


Heavy Single Pillow Block with Double Seals

WORTHWHILE *economies in design and production are given in every issue of Fafnir's house organ,* "THE DRAGON". *We will gladly add your name to the mailing list.*

FAFNIR BALL BEARINGS

PROGRESS IN STEELMAKING



Reduces Acid Consumption

Employing a definite method of controlling the pickling operation at a Detroit plant has effected a reduction in the consumption of acid of 50 per cent per ton of steel pickled. Each pickling bath is tested every 1½ hours and sufficient acid added to bring the bath up to the desired strength. The bath also is maintained at the proper temperature.

• • •

Simplifies Runway Repair

Repairing worn or corroded top plates of crane bridge girders by installing a new plate on the old member is the practice followed at a steel plant in the Pittsburgh district. Water, dirt and foreign material are excluded by employing a continuous weld for joining the plates. The rigidity of girders is increased by welding flat vertical stiffeners to the web plates and to the top and bottom angles on each side of box girder.

• • •

Affords Uniform Coating

One of the largest galvanizing kettles in this country recently was installed at a plant in the Philadelphia district. About 160 tons of molten zinc are required for the kettle which is 32½ feet long, 34 inches wide and 60 inches deep. The pot was designed after a survey of all coating jobs handled since the company engaged in business. All pieces including steel plates used by shipbuilders in hull construction can be galvanized in one immersion, thus affording a zinc coating of uniform thickness.

• • •

Effects Savings in Power

Enough savings were effected on the 20-ton charge electric furnace for melting and refining to justify the installation of a similar unit according to an operator. Cost of refractories was about the same or slightly lower than for door-charged furnaces. The largest savings were effected in the power consumption, electrodes and man-hours attendance.

• • •

Builds Experimental Unit

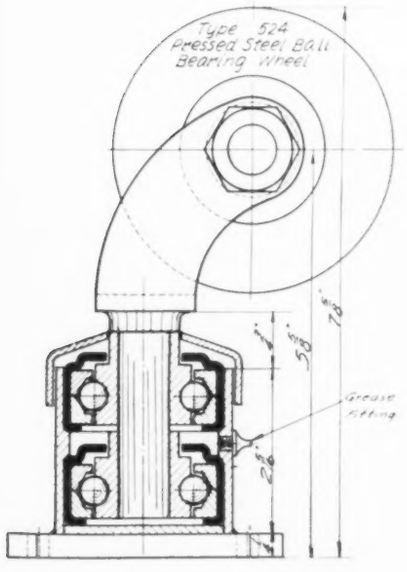
Construction of a new 6-ton open-hearth furnace to be top-fired and to be equipped with a recuperator, thus utilizing the heat of the gas of combustion for preheating the incoming air, has been started at the plant of an eastern steel company. This new unit is for purposes of experiment, to pave the way for large top-fired open-hearth furnaces not provided with the conventional reversing, regenerative chambers.

• • •

Offers Higher Ingot Yield

In excess of 500,000 pounds of copper of over 95 per cent electrical conductivity is being employed in ingot mold stools for casting low-carbon and rimming heats of steel. The use of this type stool affords a higher ingot yield, an increase of eight to ten times in the life of the stools, longer mold life and a smaller number of sticker ingots.

Carries Substantial Loads



PLATES ARE EASILY HANDLED: Plate mill casters 4 inches diameter now are built to handle loads of 300 pounds per wheel. The swivel type unit shown at left is designed with two ball bearings to support the vertical shank. The caster fork is cast steel and supports a 4-inch ball bearing wheel on a ¾-inch axle. The bearing has twelve ⅜-inch diameter hardened steel balls assembled in a hardened steel ball race. The unit shown in the accompanying illustration is a recent development of the Mathews Conveyer Co., Ellwood City, Pa.

A.S.T.M. Turns Attention to Materials for Modern House

THE relationship of materials to the house of today and tomorrow was a subject drawing considerable interest at the thirty-eighth annual meeting of the American Society for Testing Materials held in Detroit, June 24-28. Approximately 900 members and guests of the society assembled to hear the presentation of committee reports and to participate in the discussion of a wide range of technical papers. This attendance was better than last year.

Housing was the principal subject at the annual banquet with J. E. Burchard, vice president, Bemis Industries Inc., Boston, and Miles Colean, director, technical and low-cost housing divisions, federal housing administration, Washington, being the principal speakers.

Mr. Burchard spoke on the role of materials in modern housing, pointing out that the modern dwelling will be of the prefabricated type. He said: "Prefabrication will not lift us from the depression. If it succeeds, it will none the less be an intensive, not an originative industry—the product is not supplying a brand new need and hence to the extent of its success it will merely replace old materials and labor with new materials and labor, and preferably less of both.

Too Much Sales Promotion

"Many difficulties confront it before it can succeed," he said. "It has by no means arrived now although current journalistic enthusiasm might lead us to believe that it has. There is nothing new in prefabrication. Previous efforts have failed because most of them have been sponsored by people interested in selling more of their particular product—sales promoters, not research men; the few research men have not been of the building industry and have drawn very erroneous conclusions.

"Cost has almost never been faced realistically and it is on the criterion of cost that the prefabricated house will succeed or fail," maintained Mr. Burchard. "Moreover, prefabricators until recently have tried to make their product look like the old one.

"Metals are really coming into their own in this new day. The way they can be worked and the beauties they have are recognized now better than ever before. Steel has remained the background of structural efforts in prefabrication, but in other fields it will be severely pushed in years to come by copper, aluminum and possibly even lead. Moreover, its role is not in the structural field in small housing where condensation problems are severe and this is true whether the house be merely steel framed or of steel panels.

"Such buildings can be properly insulated against condensation but only with precautions that most designers have seemed unwilling to take," continued the speaker. "The same designers have adequately insulated their constructions against normal heat loss. Thus metal of the future, dyed aluminum, lacquered copper, etched steel, bonded metal, and so through a long list, will be used more and more in the future but not as structure or chassis. Their place will be as finishes, battens, cornices, and even full walls—but always as decoration with some protective qualities."

More and Better Houses

Mr. Colean spoke on the federal housing problem and stated that the federal housing administration through the national housing act is endeavoring to contribute toward building better houses, to build more houses, and provide means for removing and replacing houses outliving a reasonable usefulness.

Presiding at the open session, F. O. Clements, director of research, General Motors Research Laboratories, Detroit, and past president of the society, welcomed the visitors on behalf of the local section. Harvey J. Campbell Jr., secretary, Detroit board of commerce, presented a civic welcoming address in which he paid caustic comment to the obstacles confronting industry and in the limitation of basic principles since the signing of the "Declaration of Experimentation" in Washington.

The relationship of specifications to the engineering profession was the subject of an address by C. F. Hirshfeld, chief of research department, Detroit Edison Co., Detroit. He said: "The engineer must realize always that each item of a technical specification dealing with materials is of value only as it affects the usefulness of the material for a specific purpose. Our application of materials is practically always forging ahead of the sort of knowledge required for technically and commercially satisfactory specification." He urged more expeditious handling of specification development.

In his address as president of the society, Hermann von Schrenk, consulting timber engineer, St. Louis, stressed the relationship of specifications for various materials to each other. President von Schrenk urged more frequent exchange of information, through symposiums covering numerous materials to acquaint the specialists in various fields with the facilities or lack of specifications on the materials that are grouped in engineering structures.

Testing and reports of administrative committees occupied attention at the second session on Tuesday morning, over which President von Schrenk presided. In presenting the report of committee E-10 on standards, Chairman T. R. Lawson, Rensselaer Polytechnic institute, Troy, N. Y., stated that considerable work has been accomplished in reviewing numerous revisions to existing standards and tentative standards, contemplated changes from tentative to standard, etc.

May Create Plastics Activity

Prof. Lawson mentioned that consideration of gaseous fuels had reached the state whereby a standing committee was being formed to engage in activities relating to that subject. He also said that while as yet plastics and synthetic resins had been considered, he believed that a symposium to be held in the coming sectional meeting in New York would create sufficient interest for definite consideration of the subject as a society activity.

P. H. Bates, national bureau of standards, Washington, and chairman of committee E-9 on research, presented the report for his committee, pointing out that the subcommittee on structural steel had

New Officers

AMERICAN SOCIETY FOR TESTING MATERIALS

President

H. S. VASSAR
Laboratory engineer, Public Service Electric & Gas Co., Irvington, N. J.

Vice President

A. E. WHITE
Professor of metallurgical engineering and director of department of engineering research, University of Michigan, Ann Arbor, Mich.

Executive Committee

W. H. GRAVES
Chief metallurgist, Packard Motor Car Co., Detroit

R. L. HALLETT
Chemist, National Lead Co., Brooklyn, N. Y.

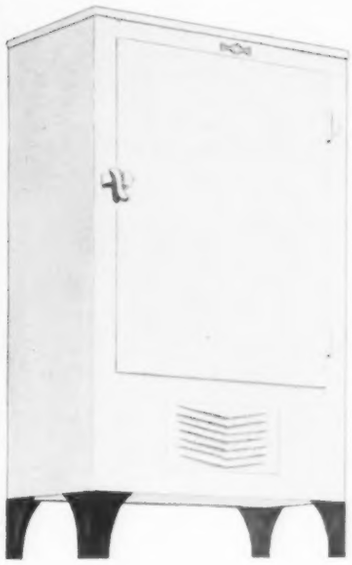
N. L. MOCHEL
Metallurgical engineer, Westinghouse Electric & Mfg. Co., Philadelphia

H. H. MORGAN
Manager, rail and fastenings department, Robert W. Hunt Co., Chicago

W. R. WEBSTER
Chairman of board, Bridgeport Brass Co., Bridgeport, Conn.

SAVE WITH STEEL.....

WEIRTON



SHEETS HAVE DONE THEIR PART IN MAKING ICELESS REFRIGERATION A SUCCESS

Weirton sheets have the *right* quality for smooth fabrication—and the *right* finish for an attractive and durable enameling job.

Weirton outstanding characteristics are the result of complete production control of our own organization—both mechanically and metallurgically—from ore mine to finished product.

See that your specifications call for Weirton Steel Sheets—and you will always receive a quality that is pre-eminently suited for your requirements.

WEIRTON PRODUCTS INCLUDE

Pig Iron
Open Hearth Steel
Billets—Slabs—Sheet Bars—Skelp
Angles, Beams and Channels
Round, Square and Flat Bars
Rails—Steel Plates—Tie Plates—Track Spikes—Splice Bars
Reinforcing Bars

Coke
Tin Plate
Kanners Special Cokes—Best Cokes—Charcoals
Lacquered and Coated Tinplate
Tin Mill Black Plate (All Finishes)
Lacquered and Coated Black Plate
Copper Bearing Terne Plate

Long Terne Sheets
(Common and Special Finishes)
Galvanized, Black and Blue Annealed Sheets
Corrugated Sheets, V Crimp Sheets, Roll Roofing

Hot and Cold Rolled Strip Steel and Strip Steel Sheets
High Finish Sheets

Single Pickled, Full Finished and Auto Body Sheets
Many gauges and grades up to seventy-five inches in width are now available

Coke—Tar—Benzol—Toluol—
Ammonium Sulphate

WEIRTON STEEL CO.

Division of National Steel Corporation

WEIRTON W. VA.

SALES OFFICES IN ALL PRINCIPAL CITIES

been marking time on its work due to the lack of laboratory facilities, and that the joint committee on investigation of the effect of phosphorus and sulphur on steel had completed its work. In closing, he expressed appreciation of his committee for the work and service of Prof. H. F. Moore, University of Illinois, Urbana, Ill., whose term just expires.

Report of committee E-1 on methods of testing was presented by W. H. Fulweiler, United Gas Improvement Co., Philadelphia, chairman, and the report included proposed revised specifications for round-hole screens for testing.

The relation between the tension static and dynamic tests was discussed in a paper by H. C. Mann, research engineer, Watertown Arsenal, Watertown, Mass. He pointed out that the dynamic or impact test gave a total energy value while that was not obtainable in the static test without additional investigation to determine its internal energy value. He described a method for trial procedure.

Hardness of Light Metals

R. L. Templin, chief engineer of tests, Aluminum Co. of America, New Kensington, Pa., discussed hardness testing of light metals and alloys in a technical paper. He made clear that effects of various factors such as load-penetrator-time relationships, size and preparation of specimens are quite different than for ferrous metals, and that relationships between different kinds of hardness and between hardness and other static properties of light alloys also are not the same as for ferrous metals.

A new method and machine for dynamic hardness testing was described by W. M. Patterson, research engineer, Tinius Olsen Testing Machine Co., Philadelphia. Mr. Patterson's paper pointed out the need for a reliable hardness scale with definite physical units of equal value throughout the scale.

At this point, Prof. H. F. Moore assumed chairmanship of the meeting which then took the form of an informal discussion of the significance of yield strength of metals in design and specifications. H. H. Morgan, Robert W. Hunt Co., Chicago, spoke on the subject from the viewpoint of the testing engineer, stating that exact knowledge is necessary for research problems while for design the regular commercial test is suitable.

L. H. Fry, Edgewater Steel Co., Pittsburgh,, discussed yield strength from the viewpoint of ferrous metals, and pleaded for a classification of materials into groups having similar properties so that definitions of yield strength, proportional limit, yield point and elastic limit for each type could be more clearly defined. Yield strength from the viewpoint of nonferrous metals was discussed by R. L. Templin who pointed out that yielding phenomenon occuring in mild steel does not appear in nonferrous metals so a rather arbitrary value has been adopted. However, long experience has demonstrated that it is accurate within acceptable limits, practical and useful.

The final discussion was made by M. F. Sayre, Union college, Schnectady, N. Y., who spoke on elastic strength and relationship to creep.

Some of the phases relating to wrought iron, steel and cast iron were covered in a session held Wednesday morning, under the chairmanship of W. M. Barr, Union Pacific Railroad Co., Omaha, Neb. The session was opened with the report of committee A-2 on wrought iron which was presented by the committee's secretary, G. H. Woodroffe, Reading Iron Co., Philadelphia. The committee recommended for publication by the society two proposed tentative standards relating to uncoated wrought iron sheets and to zinc-coated wrought iron sheets. In addition, several revisions of tentative standards and standards were submitted.

In the absence of Thomas Spooner, Westinghouse Electric & Mfg. Co., East Pittsburgh, chairman of committee A-6 on magnetic properties, report of that committee was presented by P. J. Smith. The report recommended publication of several proposed revisions and additions to the standard methods of tests for magnetic properties of iron and steel, and a proposed tentative definition of terms with units and symbols relating to magnetic testing.

Approves Three Specifications

Report of committee A-1 on steel, of which H. H. Morgan is chairman, stated that three standard specifications under its jurisdiction have been approved by the American Standards association. These related to carbon steel castings for valves, flanges and fittings for high temperature service; alloy steel bolting material for high temperature service; and forged or rolled steel pipe flanges for high temperature service.

Committee A-1 also recommended two proposed specifications for publication as tentative standards of the society, these relating to axle steel concrete reinforcement bars, and seamless low-carbon steel still tubes for refinery service. The committee also withdrew tentative specifications relating to carbon steel castings for industrial, railroad and marine uses, and work is being conducted so that separate specifications for each type may be submitted at an early date.

C. H. Gibbons, Baldwin-Southwark Corp., Philadelphia, presented a paper on the effect of cold bending on the elastic properties of heavy steel plates. The plates tested were 3½ inches thick, and were of two compositions containing 0.17 and 0.27 per cent carbon, respectively, designed for cracking still service. Results obtained indicated that unless the plates were normalized after cold bending, lower physical properties were obtained. R. K. Hopkins, M. W. Kellogg Co., Jersey City, N. J., in discussing the paper said that his company usually used hot-bending so did not encounter trouble, but in such cases where cold bending had to be used, a stress relieving or normalizing operation always was employed.

Hyman Bornstein, Deere & Co., Moline, Ill., chairman of committee A-3 on cast iron, presented his report which recommended publication of a proposed tentative standard for automotive gray iron castings which are identical in substance with those of the Society of Automotive Engineers. Work by subcommittee VI on general castings led to the elimination of the separately cast tension test bar in the tentative specifications for gray iron castings.

Cast Iron Specifications Revised

Revisions were made by this committee in the tentative specifications for cast iron culvert pipe, and definition relating to cast iron, pig iron, gray iron, white iron, mottled iron, malleable cast iron, semisteel, and high test cast iron were proposed. A revised tentative specification for chilled tread, cast iron car wheels was withdrawn for further study.

The session closed with a paper by J. O. Almen and A. L. Boegehold, General Motors Corp., Detroit, on factors which influence the life of rear axle gears. Results obtained by the authors indicate that machining and other processing operations have a greater effect on gear life than composition and heat treatment, provided the gears can be processed satisfactorily, and that tooth failures may be plotted on the familiar stress-cycle curve when gear stresses are calculated properly.

The tenth Edgar Marburg lecture was delivered Wednesday afternoon with Hermann von Schrenk, president of the society, presiding as chairman. Dr. L. B. Tuckerman, national bureau of standards, Washington, was the lecturer and he spoke on aircraft materials and methods of testing them. Dr. Tuckerman indicated that choice between high-strength aluminum alloys, and high-strength alloy steels for structural members of aircraft depended mainly upon the designer's familiarity and experience with the particular material. At present, local instability of structures causes the greatest trouble, therefore, investigation and development of design factors with fabrication methods are greatly needed.

NEW EQUIPMENT

These items of industrial equipment were announced by manufacturers last week and will be described in an early issue of STEEL:

Automatic high production press, E. W. Bliss Co., Toledo, O.
Welded steel press frame, Quickwork Co., St. Marys, O.
Punch press, Toledo Machine & Tool Co., Toledo, O.
Hydraulically-operated lathe, Lehmann Machine Co., St. Louis.
Thread grinding machine, Triplex Machine Tool Corp., New York.
Metal marking machine, R. J. Skala Co., Chicago.
Swing-out interior switch, Square D Co., Detroit.
Laboratory stirer, Chemical Publishing Co. of New York Inc., New York.
Vest pocket slide rule, Tavella Sales Co., New York.
Vacuum power switch, Continental Electric Co., St. Charles, Ill.
Floor model blueprinter, Milligan & Wright Co., Cleveland.

Chaser Grinder—

Landis Machine Co. Inc., Waynesboro, Pa., is announcing a model O chaser grinder, a new addition to its line of machines and fixtures for grinding Landis die head chasers. This unit, shown herewith, is suitable for grinding all die head chasers up to 1¼ inches in width. Although a medium sized grinder of the bench type, it also can be furnished with a pedestal for floor use if desired. This grinder is equipped with a 1/3 horsepower, alternating current single phase, 120-volt, 60-cycle fully enclosed motor, suitable for plugging into a light socket providing the proper current. The motor has a one-half hour continuous duty rating, which is ample for the ordinary requirements of grinding chasers.

Model O chaser grinder developed by Landis Machine Co.

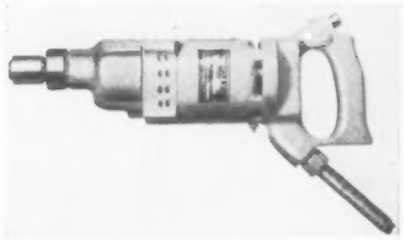
The grinder is fitted with two grinding wheels, one a 6 x 2-inch cup shaped wheel and the other a 7 x ½-inch straight wheel, of suitable grade and grain for grinding high-speed steel chasers. Right-hand side of the machine is fitted with a fixture for grinding the rake and lead angles. Means are provided for swiveling the fixture to obtain the desired angles. Graduations are provided to facilitate the obtaining of these angles. The fixture is mounted on a rotatable spindle which permits oscillating the chaser against the face of the cup wheel for the grinding operation.

A cross feed is obtainable through a hand knob on the left-hand side of the machine bed. The spindle bearing of the fixture is fully enclosed to protect it from grinding dirt. The chaser is held in the vise by its dovetailed bottom and tightened securely by a hand knob. An adjustable fixture is also attached to the left hand side of the machine for grinding the "lip" in the rake angle. A grinder is attached to the table of this fixture to control the lead angle and thus insure uniform grinding.

♦ ♦ ♦

Electric Screwdriver—

Buckeye Portable Tool Co., Dayton, O., recently announced a new high frequency electric screwdriver designated No. 21-S. The unit, shown herewith, is designed principally for operation on the production line, but with the use of an extra nut socket it is adaptable for light nut running. It also can be furnished with a reversing switch. Speed range covers 500, 750 and 1000 revolutions per minute; capacity, No. 12 and 14 screws, and 3/16 and ¼-inch nuts. Overall length is 15 inches.



Buckeye high frequency electric screwdriver, designated No. 21-S

♦ ♦ ♦

Welding Manipulator—

United Engineering & Foundry Co., Pittsburgh, is announcing a welding manipulator which permits positioning all work to be welded so that fillet welds of correct radius can be made without waste of electrode materials. Savings of 25 to 40 per cent in welding time alone are effected, according to the manufacturer. In addition to reducing welding costs and improving the quality of work, this manipulator frees the overhead crane for other duties and eliminates the riggers which are necessary for crane handling.

The welding manipulator is portable and in general consists of a face

NEW welding manipulator introduced by United Engineering & Foundry Co., can be tilted or rotated to any desired position. The welding operator rides with the work and obtains proper positions by means of push button control

MIDVALE

and PRECISION ☆ ☆ ☆

NOT simply the precision of the Midvale laboratory, determining exactly what alloys best secure certain results . . . not simply the precision which accompanies every stage in the making of Midvale steel, raw material, proportions, temperatures . . . all the way through, but precision as it applies to *your* use of any product of Midvale, whether a simple piece of tool or die steel or a finished machined part. *That* is the precision Midvale is always working for, and that is the precision which *counts*—precision you secure as you work with a product of Midvale. It is this precision which makes some people call Midvale "the craftsmen of the steel industry."

THE MIDVALE COMPANY · · NICETOWN, PHILADELPHIA

OFFICES: *New York · Chicago · Pittsburgh · Washington · Cleveland · San Francisco*

plate operated by power supplied by an electric motor of the "Linc-Weld" type manufactured by Lincoln Electric Co., Cleveland. Operation of the electric motor is controlled by push buttons mounted on an extension cord. By pressure of the proper control button, the face plate can be tilted or rotated to any desired position, the operator riding with the work, as shown in the illustration on page 55.

Only two handling operations are necessary when using the welding manipulator. These consist merely of placing the work on the face plate for welding and then removing it after welding is completed. Ample provisions for mounting the work are readily available in the face plate. Capacity of the manipulator illustrated is from 5 to 7 tons, depending on the center of gravity of the work being handled.

♦ ♦ ♦

Cutter and Tool Sharpening Machine—

Cincinnati Milling Machine Co., Cincinnati, announces that its No. 2 plain and universal cutter and tool sharpening machine has been improved by the adoption of a solid and heavier table slide and by the addition of duplicate operating controls on the

Improved Cincinnati No. 2 cutter and tool sharpening machine

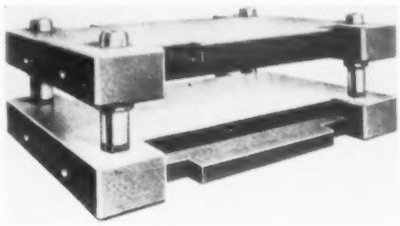
left side of the machine when facing the machine from the rear. In the grinding of large rotary cutters the solid and heavier table slide reduces vibration to a minimum, resulting in a truer and more even cutting edge. The solid table also permits heavy loading when the table is displaced angularly as in the grinding of dovetail milling cutters.

Addition of left-hand operating controls increases the adaptability and universality of this machine, shown herewith. Regardless of the type of work, this machine affords a normal operating position. Not only accomplishing this, the machine retains such features as correct location of the work and tooth rest with respect to the right approach to the grinding wheel, unlimited visibility of the work and grinding wheel, accessibility to make changes in the setup and to true the grinding wheel without leaving the operating position, and safety of operation.

♦ ♦ ♦

Standard Die Sets—

Danly Machine Specialties Inc., Chicago, recently introduced a new line of standard die sets for heavy work. In the past, according to the manufacturer, these large die sets usually have been made special as a part of the die design. The Danly method of standardizing specials brings substantial economies. Before



Four-post standard die set built by Danly Machine Specialties Inc.

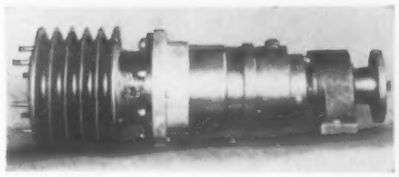
setting up for production on this line, the company conducted an extensive survey to determine what could be considered as standard in the large die set field. Types, sizes and thickness combinations of the new line of large standard die sets are the result of this survey. Sizes range from 10 x 18 to 46 inches x 100 inches; practically unlimited possibilities as to combination; available in all steel or semi-steel.

♦ ♦ ♦

Power Takeoff—

Davey Compressor Co. Inc., Kent, O., recently placed on the market a power takeoff, shown herewith. The unit first was employed in driving an air compressor mounted on truck chassis, by means of the truck motor itself. It is equally adaptable for operating other kinds of truck-mounted machinery, however, such as pumps, portable generating plants for lighting systems, arc welders, etc.

The power takeoff operates from



Davey power takeoff for utilizing the power of motor trucks

the truck drive shaft by a clutch and is controlled from the driver's cab. A pull of the lever engages the clutch, applying the full power of the truck motor to operation of compressor or other equipment, through a sheave and V-belts. Weight is reduced and operations simplified through elimination of a separate motor to operate compressor or other unit, the manufacturer brings out.

♦ ♦ ♦

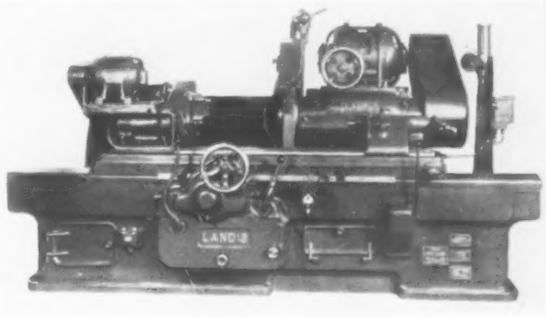
Hydraulic Grinding Machines—

Landis Tool Co., Waynesboro, Pa., announces a new 10, 14 and 16-inch type D plain hydraulic grinders. The accompanying illustration shows the 10 by 36-inch size which with the 14-inch size may be used for grinding of spindles and shafts of many types and sizes. These same units, the manufacturer declares, are ideal for grinding crankshaft line bearings. Other suggested uses are for tinning rolls, camshaft main bearings and motor armatures. The 16-inch sizes may be used instead of the 10 and 14-inch sizes for the grinding of many of the foregoing parts which might require a machine of greater swing. Small straight faced rolls may be ground to advantage. Because of the weight, size and power of the machines, they may be used for wide wheel and multiple wheel grinding.

A 30-inch diameter grinding wheel is considered standard. Provision has been made, however, for the use of a 36-inch diameter wheel on 10-inch machines, or a 42-inch diameter wheel on 14 and 16-inch machines. These larger diameter wheels are especially desirable where crankshaft line bearings are to be ground as their use considerably decreases wheel truing and wheel changing time.

The type D hydraulic system is of

VARIOUS controls of this Landis type D hydraulic grinder are fitted snugly against the bed and covered. All hydraulic controls are at the front of the bed, behind one cover



the dual cylinder type. It provides a wide range of work table speeds with smoothness of traversal at any speed between the minimum of 6 inches per minute and the maximum of 240 inches per minute. Due to the use of dual cylinders (one for movement in each direction), the volume of oil in each is constant and the speed is therefore constant in both directions. Table speeds are regulated by a convenient valve which governs the flow of oil from the end of one cylinder to the corresponding end of the other.

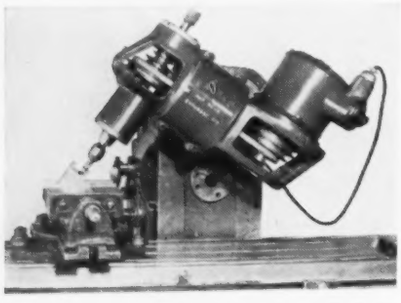
Hydraulic straight infeed mechanism is available, altho it is not considered standard equipment. It is a feature almost indispensable for straight infeed grinding operations such as crankshaft line bearing grinding, multiple wheel grinding and most wide wheel grinding. When used, it causes the wheel to feed in rapidly until it about to come in contact with the work, at which time its speed slows down automatically to the predetermined grinding feed and continues to feed in at this slower speed until the base comes against the positive stop. Reversal of the control causes the base to feed rapidly back to its starting position.

These new machines are offered in hydraulic or hand traverse, in swings of 10, 14 and 16-inches and in lengths of 18, 36, 48 and 72 inches. The wheel drive motor is either a 20 or 25 horsepower, depending upon the wheel used. The pump drive motor is 3 horsepower and the work drive motor either 1 or 1½ horsepower, depending upon the swing.

♦ ♦ ♦

Milling Attachment—

Dalrae Tools Co., Syracuse building, Syracuse, N. Y., announces a high-speed milling attachment for use on milling machine and horizontal boring mills. This unit, shown herewith, when mounted on the overarm of a machine, swivels in four directions, and mills at any angle. It is manufactured in one size only, but may be equipped with either ¼ or ½ horsepower motor. The ¼ horsepower attachment produces speeds of 500, 1200, 2500 and 4000 revolutions per minute, and has a capacity to mill with cutters from 1/16 to 9/16 inch in diameter in steel, while the ½ horsepower attachment produces speeds of 350, 650, 1700 and 3000 revolutions per minute, and has capacity to mill with cutters from ⅛ to ⅞ inch in steel.



Dalrae milling attachment embodies aluminum alloy castings

Four steel gripping pads of wide surface and a yoke which is not split, insure rigid mounting. Squaring surfaces and a graduated scale are provided for ease and speed in setting the attachment at the desired angle. The standard attachment is built to fit a 4¼ inch diameter milling machine overarm, but adapters for smaller diameters, for rectangular overarms and for horizontal boring mills may be had at small additional cost. The attachment is equipped with a unique draw-in-rod which pushes the collets out as well as clamping them in, eliminating the necessity of knocking them out at the risk of damaging the bearings. Best results are obtained with the split type collet with a 100 per cent bearing in the taper hole of the spindle which is a No. 7 Brown and Sharpe standard taper.

♦ ♦ ♦

Shovels, Cranes, Draglines—

Link-Belt Co., 910 South Michigan avenue, Chicago, recently introduced two new models of crawler-operated shovels, cranes, draglines to be known as K-40 and K-45, respectively. As a shovel, these machines are standardly equipped with a 22-foot shovel boom; a 16½-foot dipper stick; and a manganese steel, heavy-duty dipper which is of 1¼ cubic yard struck-measure capacity on the K-40, and 1½ cubic yards struck-measure capacity on the K-45, or with correspondingly larger dipper for lighter service.

Link-Belt crawler-mounted shovel, crane and dragline

As a dragline, the K-40 will handle a 1¼ to 1½ cubic yard capacity heavy-duty bucket on a 45 to 50-foot boom, and the K-45 a 1½ to 1¾ cubic yard capacity heavy-duty dragline bucket. Correspondingly larger buckets for lighter service may be used. In either case, the boom may be used at any angle convenient for dragline work.

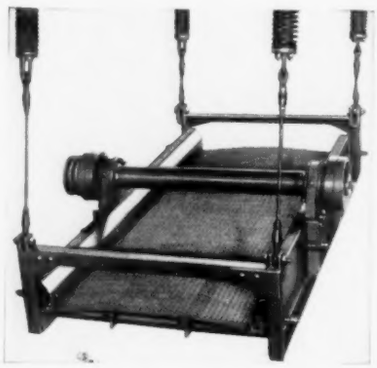
As a crane, the K-40 has a rated capacity of 21 tons at 12-foot radius and 6600 pounds at 45-foot radius, on a 45-foot boom. The K-45 has a rated capacity of 25 tons at 12-foot radius and 7600 pounds at 45-foot radius, on a 45-foot boom. Each machine has corresponding capacities at other radii and for other boom lengths.

As a trench hoe, the character of work and digging depth determine the size of bucket used. For normal digging depth, in average soils, the K-40 machine is standardly furnished with a 1½ cubic yard solid-bottom bucket, and the K-45 with a 1¾ cubic yard solid-bottom bucket.

♦ ♦ ♦

Single-Deck Screen—

Allis-Chalmers Mfg. Co., Milwaukee., has introduced a new single-deck screen in sizes from 1½ x 3 to 5 x 10 feet. These screens, of the float-in-air type, are suspended by cables and springs. A rapid adjustable vibrating motion is produced by counter-weighted wheels mounted on the drive shaft and supported by anti-friction bearings above the screen body or vibrating member. The screen will handle medium to fine size commercial materials in moderate tonnages. The unit is claimed to be especially suitable for raw foundry sand. However, the double-deck screen of the same type is employed for reconditioning.



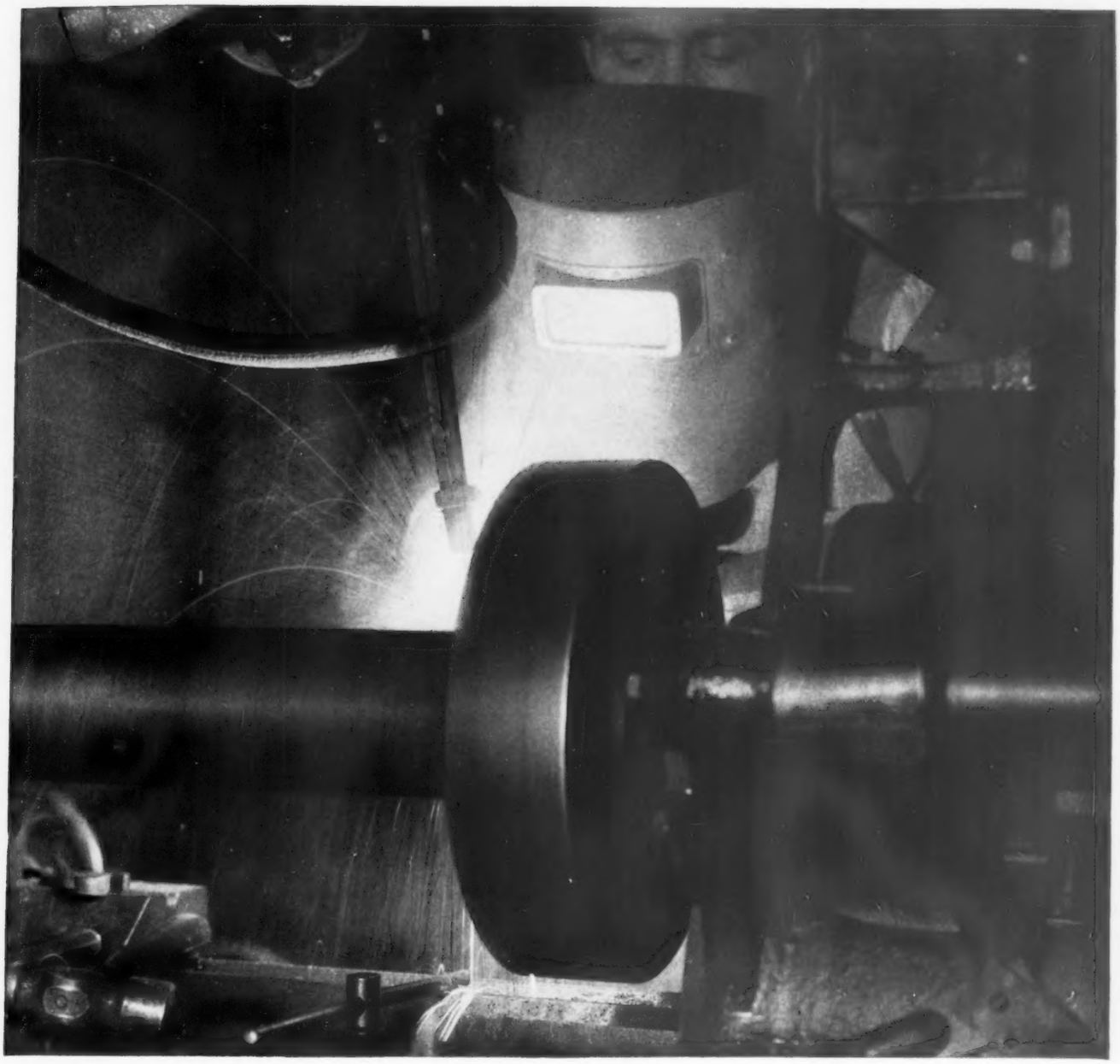
Allis-Chalmers screen suitable for handling raw foundry sand

♦ ♦ ♦

Air Cap for Spray Gun—

DeVilbiss Co., Toledo, O., announces a new No. 64 air cap to be used with its type MBC spray gun for handling porcelain enamel. The device is designed for high-speed application, operating best at air pressures between 70 and 85 pounds, and fluid pressures of 10 to 18 pounds. It is of the wide horn, twin jet type, with two auxiliary atomizing jets at the center, the wide horns eliminating the tendency of the material to build up. Although essentially a high pressure cap, the No. 64 may also be used with low pressure or gravity feed on such work as edging.

Roebling — the custom-made wire for exacting welders



YOU can be certain that all Roebling Welding Wire...every bundle...every coil...every foot...will be uniformly of the same high quality. For it is a wire made specifically for welding purposes...by Roebling's special custom methods. This wire is absolutely uniform in quality and is free of non-metallic impurities. ¶ May we send you full information, prices, or samples? Available in electric and gas types; in a variety of straight lengths or in coils.

JOHN A. ROEBLING'S SONS CO., TRENTON, N.J.

Branches in Principal Cities

ONLY A FINE PRODUCT MAY BEAR THE NAME ROEBLING

Roller Bearings for Precision Mills

(*Concluded from Page 35*)

curate and exactly square with the neck and center line of the roll.

Grooving of rolls is important. The determination of the exact shape of each groove is a matter of long experience and will vary with the number of passes from billet to finished product. A slight variation in machining may result in extreme variation in the product.

Mounting rolls in their housings is of extreme importance. Provision must be made to hold the rolls in a definite and accurate position for maximum time; that is, there should be no wear in the bearings sufficient to permit roll movement, either in a vertical or lengthwise direction. It is in the maintenance of this accuracy and also in relief from constant pass readjustment that roller bearings play so important a part. Roller bearings are available which do not show wear in vertical or lengthwise directions. By taking advantage of this feature, it is possible to obtain perfect alignment and setting of rolls and to maintain this setting indefinitely. It is also possible, by proper design, to make provision on the mill for adjusting devices which will permit setting the rolls or changing the setting by small increments in a minimum of time. Once adjusted, the operator can be sure rolls will stay put and the only adjustments which he need consider are those required to compensate for wear in the roll passes.

Mill Housing Design Studied

Together with roll mounting, considerable study should be given to design of mill housings. Housings as well as other parts of individual stands are stretching constantly and contributing to the change in the passes. For precision rolling, stiffer or possibly oversize housings should be used. Careful control of the rolling loads, by the balancing of passes or possibly by reducing the work per pass and increasing the number of passes, will help considerably in the final accuracy of product.

Much attention has been given recently to vertical mills and a number of such mills have been installed. These have been of overhung-roll type and full-sided roll type. In one plant where extremely accurate rolling has been done, a vertical mill with full-sized rolls supported in bearings at both ends and with a full complement of roll passes, has been used successfully.

The rolls in this mill are adjustable up and down so as to line up properly with the passes in the preceding horizontal stand. The rolls are also adjustable sidewise to line up with the passes of the preceding stand. In addition, a fine vernier adjustment is provided for moving the rolls longitudinally with respect to each other so as to obtain accurate pass alignment. Finished product of this mill is held to less than one-third of standard commercial tolerances.

Some experimenting has been done on use of anti-friction bearing thrust units in connection with ordinary plain bearings or composition bearings. The theory behind this work has been that radial wear could be reduced materially by improved lubrication on plain bearings or by use of composition bearings. The antifriction thrust units are used to maintain the endwise position of the rolls. The units are provided with an accurate micrometer end-adjustment which makes it possible to accurately line up the passes.

Complete results on the use of these units are not available. It has been found not sufficient to use such units only on the finishing stand. They must be used also farther back in the mill and are consequently applicable only in continuous mills. It was found to be a difficult job to apply a thrust unit to a roll with the required accuracy. Because of the high speed of the mill, a small amount of misalignment caused considerable run-out with consequent pinching of the bearings in the thrust units. It was further found that condition of wobblers and pods had to be watched carefully. Worn wobblers and pods caused end thrusts considerably in excess of the capacity of the bearings. Such a condition undoubtedly can be remedied by use of universal couplings.

Suggestion for Precision Mill

Another suggestion for a precision mill is a backed-up mill described by its designer as follows:

"The 4-high bar or rod mill stand is unique in that the rolling pressure is to be used as a means to prevent endwise motion of the work rolls. The pressure will force the convex surface of the work roll into the concave surface of the back roll, resulting in a wedging action between the two rolls, thereby preventing any relative endwise motion between them.

"Similarly, one-half of the rolling load will be transmitted through the inner race of the double-row tapered bearing on the front backing roll neck into the conical rollers and through them into the outer races. All these actions have the same wedging effect, and consequent prevention of relative endwise motion.

"The amount of variation in finished bars or rods when hot rolled in mills of this design, of course, will be dependent to some extent upon the amount of the variation in temperature and in the cross section of the bar delivered to these stands. The effect of endwise motion of the rolls probably has not been given the consideration it deserves.

"The strength and rigidity of mills made to this design and the prevention of endwise motion of the work rolls undoubtedly should result in a considerable reduction in hot rolling variations."

To the writer's knowledge a mill of this type has not been built. It would be interesting to see the results which would actually be obtained.

To Buy or Not To Buy?

(*Concluded from Page 49*)

now makes it possible to make intelligent recommendations. This comparatively new machining art, when properly applied, results in lower costs.

We read much about the phenomenal development in the technique of steel manufacture. Marvelous new mills are being installed for rolling sheets. Not only do these mills roll sheet steel faster, but they produce an infinitely higher quality of product. To achieve this result, it has been necessary to improve the surfaces of the rolls themselves. New precision roll grinding machines have resulted.

Recently, there has come to our attention an example of the savings possible through the application of improved centerless grinding. A manufacturer of distributor shafts is now producing by means of this new grinding setup, a shaft approximately 6 inches long, having five diameters which must be finished to size and concentric within 0.0005-inch at a cost of one-fifth his former costs.

Piston pins today are centerless ground and lapped to limits that up until recently were required only for laboratory purposes. They are finished on a production basis at costs which are extremely low. In each case cited above, an improvement in the product itself went along with the reduction in manufacturing cost.

Profitable operations in the future would seem to demand the replacement of old machine tools with modern designs.

Rate Rebounds to 37; Half-year Shows Loss

Market Sentiment Strong As Heavier Construction Requirements Appear

MARKET IN TABLOID

DEMAND . . . *Structural, miscellaneous, fairly strong.*

PRICES . . . *Generally firm; more pressure on reinforcing bars.*

PRODUCTION . . . *Ingots up 1½ points to 37 per cent; widespread suspensions for July 4th week.*

SHIPMENTS . . . *Show little change.*

STEEL production for 1935 crosses the year's half-way mark today with a record slightly below that of the comparable period in 1934.

Substantial gains in output in the earlier months this year have disappeared, yet sentiment in the markets now probably is stronger than at any time in the past several years.

With steelworks operations for June estimated, the average for six months is about 46 per cent, or one point below that last year. For every point the industry makes an average of 2200 gross tons of ingots, so that the official figures when available this week will show a moderate loss.

Sixty-five per cent of last year's production fell in the first half, while steelmakers now are confident the next six months will bring out a much heavier demand than that in the first six.

Miscellaneous requirements have held up better than expected, and aided by rebounds at Chicago, Detroit, Youngstown and in New England the steel rate last week recovered 1½ points to 37 per cent. Apparently some of this gain was in anticipation of widespread suspensions for July 4, which in numerous instances will extend over the entire week.

The seasonal bottom in automobile assemblies is due late this month or early August, and beginning about the middle of August steel shipments will be resumed on a heavier basis. Chevrolet and Chrysler plan to be in production on new models by Aug. 15. Assemblies last week totaled 89,000, down 1500.

At the moment, construction work gives the most tangible promise of developing heavy tonnages. The industry had another fairly good week in structural shape awards, at 21,342 tons. Public works projects in the Middle West requiring 45,000 tons are scheduled for early closing. The navy has issued specifications for 13 vessels to be built in private yards, taking 24,275 tons of steel, to be awarded in August.

Next week the first specifications are expected to be issued on 65,000 tons of steel for the 5125 freight cars awarded by the Chesapeake & Ohio railroad. Canadian Pacific is inquiring for 1200 freight cars, Canadian National, 1100. Wabash has purchased 5000 tons of rails.

Tractor plants and some farm implement builders have not experienced a seasonal recession, and the former are likely to be rushed for the next two months. Tin plate production apparently will be given a lift by the adoption of tin cans for marketing beer. A large brewing interest has placed a contract for cans requiring a heavy tonnage.

Reinforcing bar prices are under increasing pressure, but other steel prices are apparently firm. New steel contract forms for third quarter are the same as those used heretofore, except reference to codes is eliminated. Extras are referred to as standard extras. Another influx of foreign pig iron is affecting eastern markets.

June pig iron shipments in the Middle West were only 10 per cent less than those in May. Republic Steel Corp. has relighted one of its Buffalo furnaces. Scrap consumers claim to be well supplied, while dealers will not sacrifice to sell.

Detroit steelworks operations last week advanced 24 points to 94 per cent; Chicago 2 to 41; New England 5 to 61; Youngstown 1 to 42. Cleveland was down 2 to 46, while others were unchanged.

STEEL's iron and steel price composite is down 1 cent to $32.39; the finished steel index remains $54, while the scrap composite is off 4 cents to $10.34.

COMPOSITE MARKET AVERAGES

	June 29	June 22	June 15	One Month Ago May, 1935	Three Months Ago March, 1935	One Year Ago June, 1934	Five Years Ago June, 1930
Iron and Steel	$32.39	$32.40	$32.41	$32.35	$32.26	$32.96	$33.28
Finished Steel	54.00	54.00	54.00	54.00	54.00	55.08	52.37
Steelworks Scrap....	10.34	10.38	10.46	10.27	10.75	10.32	13.11

Iron and Steel Composite:—Pig iron, scrap, billets, sheet bars, wire rods, tin plate, wire, sheets, plates, shapes, bars, black pipe, rails, alloy steel, hot strip, and cast iron pipe at representative centers. Finished Steel Composite:—Plates, shapes, bars, hot strip, nails, tin plate, pipe. Steelworks Scrap Composite:—Heavy melting steel and compressed sheets.

A COMPARISON OF PRICES

Representative Market Figures for Current Week; Average for Last Month, Three Months and One Year Ago

Finished Material

	June 29, 1935	May, 1935	Mar., 1935	June, 1934
Steel bars, Pittsburgh	1.80c	1.80c	1.80c	1.90c
Steel bars, Chicago	1.85	1.85	1.85	1.95
Steel bars, Philadelphia	2.11	2.11	2.09	2.19
Iron bars, Terre Haute, Ind.....	1.75	1.75	1.75	1.85
Shapes, Pittsburgh	1.80	1.80	1.80	1.85
Shapes, Philadelphia	2.01½	2.01½	2.00½	2.05½
Shapes, Chicago	1.85	1.85	1.85	1.90
Tank plates, Pittsburgh	1.80	1.80	1.80	1.85
Tank plates, Philadelphia	2.00	1.99	1.98½	2.03½
Tank plates, Chicago	1.85	1.85	1.85	1.90
Sheets, No. 10, hot rolled, Pitts...	1.85	1.85	1.85	2.00
Sheets, No. 24, hot ann., Pitts....	2.40	2.40	2.40	2.65
Sheets, No. 24, galvan., Pitts.....	3.10	3.10	3.10	3.25
Sheets, No. 10, hot rolled, Gary..	1.95	1.95	1.95	2.10
Sheets, No. 24, hot anneal., Gary	2.55	2.55	2.55	2.75
Sheets, No. 24, galvan., Gary.....	3.20	3.20	3.20	3.35
Plain wire, Pittsburgh	2.30	2.30	2.30	2.30
Tin plate, per base box, Pitts.....	5.25	5.25	5.25	5.25
Wire nails, Pittsburgh	2.60	2.60	2.60	2.60

Semifinished Material

Sheet bars, open-hearth, Youngs.	$28.00	$28.00	$28.00	$30.00
Sheet bars, open-hearth, Pitts.....	28.00	28.00	28.00	30.00
Billets, open-hearth, Pittsburgh....	27.00	27.00	27.00	29.00
Wire rods, Pittsburgh	38.00	38.00	38.00	38.00

Pig Iron

	June 29, 1935	May, 1935	Mar., 1935	June, 1934
Bessemer, del. Pittsburgh	$19.81	$19.80	$19.76	$19.76
Basic, Valley	18.00	18.00	18.00	18.00
Basic, eastern, del. eastern Pa.....	19.76	19.81	19.76	19.76
No. 2, foundry, del. Pittsburgh.....	19.31	19.30	19.26	19.26
No. 2, foundry, Chicago	18.50	18.50	18.50	18.50
Southern No. 2, Birmingham.....	14.50	14.50	14.50	14.50
No. 2X eastern, del. Philadelphia..	20.68	20.68	20.68	20.63
Malleable, Valley	18.50	18.50	18.50	18.50
Malleable, Chicago	18.50	18.50	18.50	18.50
Lake Superior charcoal, del. Chi.	24.25	24.25	24.25	24.04
Ferromanganese, del. Pittsburgh..	90.13	90.13	90.13	90.00
Gray forge, del. Pittsburgh	18.67	18.66	18.66	18.88

Scrap

Heavy melting steel, Pittsburgh	$12.00	$12.00	$12.00	$11.90
Heavy melt. steel, No. 2, east. Pa.	9.50	9.25	9.15	8.95
Heavy melting steel, Chicago	10.25	10.20	10.45	9.75
Rails for rolling, Chicago	11.25	11.05	11.55	11.25
Railroad steel specialties, Chicago	11.75	11.40	11.55	11.25

Coke

Connellsville, furnace, ovens.....	$3.40	$3.60	$3.60	$3.60
Connellsville, foundry ovens.....	4.60	4.60	4.60	4.60
Chicago, by-product foundry, del.	9.25	9.25	9.25	9.25

Steel, Iron, Raw Material, Fuel and Metals Prices

Except when otherwise designated, prices are base, f.o.b. cars. Asterisk denotes price change this week.

Sheet Steel

Hot Rolled No. 10, 24-48 in.

Pittsburgh	1.85c
Gary	1.95c
Chicago, delivered..	1.98c
New York, del.	2.20c
Philadelphia, del.	2.16c
Birmingham	2.00c
St. Louis, del.	2.17c
Pacific ports, f.o.b. cars, dock	2.40c

Hot Rolled Annealed No. 24

Pittsburgh	2.40c
Gary	2.50c
Chicago, delivered..	2.53c
Detroit, delivered....	2.60c
New York, del.	2.75c
Philadelphia, del.	2.71c
Birmingham	2.55c
St. Louis, del.	2.72c
Pacific ports, f.o.b. cars, dock	3.05c

Galvanized No. 24

Pittsburgh	3.10c
Gary	3.20c
Chicago, delivered..	3.23c
Philadelphia, del	3.41c
New York, del.	3.45c
Birmingham	3.25c
St. Louis, del.	3.42c
Pacific ports, f.o.b. cars, dock	3.70c

Tin Mill Black No. 28

Pittsburgh	2.75c
Gary	2.85c
St. Louis, delivered..	3.07c

Cold Rolled No. 10

Pittsburgh	2.50c
Gary	2.60c
Detroit, delivered....	2.70c
Philadelphia, del.	2.81c
New York, del.....	2.85c
Pacific ports, f.o.b. cars, dock	3.10c

Cold Rolled No. 20

Pittsburgh	2.95c
Gary	3.05c
Detroit, delivered....	3.15c
Philadelphia, del.	3.26c
New York, del.	3.30c

Enameling Sheets

Pittsburgh, No. 10..	2.50c
Pittsburgh, No. 20..	3.10c
Gary, No. 10	2.60c
Gary, No. 20	3.20c

Tin and Terne Plate

Gary base, 10 cents higher.

Tin plate, coke base con. (box) Pitts...	$5.25
Do., waste-waste..	2.75c
Do., strips	2.50c
Long ternes, No. 24 unassorted, Pitts.	3.40c
Do., Gary	3.50c

Corrosion and Heat-Resistant Alloys

Pittsburgh base, cents per lb.

Chrome-Nickel

	No. 302	No 304
Bars	23.00	24.00
Plates	26.00	28.00
Sheets	33.00	35.00
Hot strip	20.75	22.75
Cold strip	27.00	29.00

Straight Chromes

	No. 410	No. 430	No. 442	No. 446
Bars	17.00	18.50	21.00	26.00
Plates	20.00	21.50	24.00	29.00
Sheets	25.00	28.00	31.00	35.00
Hot strip	15.75	16.75	21.75	26.75
Cold stp...	20.50	22.00	27.00	35.00

Steel Plates

Pittsburgh	1.80c
New York, del.	2.09c
Philadelphia, del.	1.99c
Boston, delivered....	2.22c
Buffalo, delivered....	2.05c
Chicago or Gary.....	1.85c
Cleveland, del.	1.99½c
Birmingham	1.95c
Coatesville, base	1.90c
Sparrows Pt., base	1.90c
Pacific ports, f.o.b. cars, dock	2.35c
St. Louis, delivered	2.07c

Structural Shapes

Pittsburgh	1.80c
Philadelphia, del.	2.01½c
New York, del.	2.06½c
Boston, delivered....	2.20½c
Bethlehem	1.90c
Chicago	1.85c
Cleveland, del.	2.00c
Buffalo	1.90c
Gulf Ports	2.20c
Birmingham	1.95c
Pacific ports, f.o.b. cars, dock	2.35c

Bars

Soft Steel

Pittsburgh	1.80c
Chicago or Gary	1.85c
Duluth	1.95c
Birmingham	1.95c
Cleveland	1.85c
Buffalo	1.90c
Detroit, delivered....	1.95c
Pacific ports, f.o.b. cars, dock	2.35c
Philadelphia, del.	2.11c
Boston, delivered....	2.22c
New York, del.	2.15c
Pitts., forg. qual.....	1.95c-2.05c

Rail Steel

To Manufacturing Trade

Pittsburgh	1.70c
Chicago or Gary	1.75c
Moline, Ill.	1.75c
Cleveland	1.75c
Buffalo	1.80c

Iron

Troy, N. Y.	1.70c
Terre Haute, Ind.	1.75c
Chicago	1.80c
Philadelphia	1.91c
Pittsburgh, refined	2.75-7.50c

Reinforcing

New billet, straight lengths, quoted by distributors.

Pittsburgh	2.05c
Chicago, Gary, Buffalo, Cleve., Birm., Young.	2.10c
Gulf ports	2.45c
Pacific coast ports f.o.b. cars dock	2.45c
Philadelphia, del.	2.36c

Rail Steel

Straight lengths quoted by distributors

Pittsburgh	1.90c
Chicago, Buffalo, Cleveland, Birm., Young.	1.95c
Gulf ports	2.30c

Wire Products

(Prices apply to straight or mixed carloads; pool cars, or less, 15c up. 10% dis. on nail extras on stright or mixed carloads to one consignee.)

Base Pitts.-Cleve. 100 lb. keg.

Standard wire nails	$2.60
Cement coated nails	2.60
Galvanized nails, 15 gage and coarser	4.60c
do., finer gage and finer (per pound)	5.10c
Polish staples	3.30c
Galvanized fence staples	3.55c
Barbed wire, galv.	3.00c
Annealed fence wire	2.45c
Galvanized fence wire	2.80c
Woven wire fencing (base column, c.l.)	$63.00
Plain wire, 6-9 gage to mfg. trade	2.30c

Anderson, Ind., (merchant products only) and Chicago up $1; Duluth up $2; Birmingham up $3.

Spring wire, Pittsburgh or Cleveland	2.90c

Do., Chicago up $1, Worcester, $2.

Cold-Finished Carbon Bars and Shafting

Base Pitts., one size, shape, grade, shipment at one time to one destination

10,000 to 19,999 lbs	1.95c
20,000 to 59,999 lbs.	1.90c
60,000 to 99,999 lbs.	1.85c
100,000 lbs. and over	1.82½c

Gary, Ind., Cleveland, up 5c; Buffalo, up 10c; Detroit, up 20c; eastern Michigan, up 25c.

Alloy Steel Bars (Hot)

Pittsburgh, Buffalo, Chicago, Massillon, Canton, Bethlehem	2.45c

Alloy S.A.E.	Diff.	Alloy S.A.E.	Diff.
2000	0.25	3100	0.55
2100	0.55	3200	1.35
2300	1.50	3300	3.80
2500	2.25	3400	3.20

4100 0.15 to 0.25 Mo....0.50
4600 0.20 to 0.30 Mo. 1.25-1.75 Ni....1.05
5100 0.80-1.10 Cr....0.45
5100 Cr. spring....base
6100 bars....1.20
6100 spring....0.70
Cr., Ni., Van....1.50
Carbon Van....0.95
9250....Carbon base plus extras

Piling

Pittsburgh	2.15c
Chicago, Buffalo	2.25c

Strip and Hoops

Hot strip to 23¼-in.

Pittsburgh	1.85c
Chicago, base	1.95c
Birmingham base	2.00c
Detroit, delivered	2.05c
Philadelphia, del.	2.16c
New York, del.	2.20c
Cooperage hoop, Pittsburgh	1.95c
Chicago	2.05c
Cold-rolled strip, Pitts., Cleve.	2.60c
Worcester, Mass.	2.80c

Rails, Track Material

(Gross Tons)

Standard rails, mill	$36.37½
Relay rails, Pitts. 24-45 lbs.	$26.00
50-60 lbs.	$23.00
70-75 lbs.	$20.00
80-85 lbs.	$24.00
100 lbs.	$25.00
Light rails, billet qual. Pitts., Chi.	$35.00
Do., reroll. qual.	34.00
Angle bars, billet, Gary, Ind., So. Chi.	2.55c
Do., axle steel	2.10c
Spikes, R. R. base	2.40c
Track bolts, base	3.55c
Tie plates, base	1.90c

Base, light rails 25 to 40 lbs.; 50 to 60 lbs. inclusive up $5; 16 and 20 lbs., up $1; 12 lbs. up $8; 8 and 10 lbs., up $5. Base railroad spikes 200 kegs or more; base tie plates 20 tons.

Bolts and Nuts

Pittsburgh, Cleveland, Birmingham, Chicago. Discounts to legitimate trade for all case lots, Dec. 1, 1932, lists, 10% extra for less full containers.

Carriage Bolts

All sizes, cut thread	70-10-5 off
Rolled thread, ½ x 6, smaller	70-10-5 off

Machine Bolts

All sizes cut thread lag screws, plow bolts, Nos. 1-2-3-7 heads, tap bolts, blank bolts stud bolts	70-10-5 off
Tire bolts	60-5 off
Stove bolts, 75 off in pkgs.; 83 off on 15,000 of 3-inch and shorter, or 5000 over 3-inch.	
Rolled thread machine, ½ x 6, smaller	70-10-5 off
Step bolts	70-5 off
Elevator bolts	70-5 off

Nuts

S.A.E. semifinished hex.; ½ to ⅞-inch	70-10-5 off
Do., ½ to 1-inch	70-10-5 off
Do., over 1-inch	70 off

Hexagon Cap Screws

Milled	85-10 off
Upset, 1-in., smaller	87½ off

Square Head Set Screws

Upset, 1-in., smaller	80 off
Headless set screws	75 off

Rivets, Wrought Washers

Struc., c. l., Pittsburgh, Cleveland	2.90c
Struc., c. l., Chicago	3.00c
⅞-in. and smaller, Pitts., Chi., Cleve.	70 and 5 off
Wrought washers, Pitts., Chi., Phila., to jobbers & large nut, bolt mfrs.	$6.25 off

Cut Nails

Cut nails, Pitts.; (10% discount on size extras)	$2.75
Do. less carloads, 5 kegs or more no discount on size extras	$3.05
Do. under 5 kegs; no discount on size extras	$3.20

Pipe and Tubing

Base $200 net ton, except on standard commercial seamless boiler tubes under 2 inches and cold drawn seamless tubing.

Welded Iron, Steel Pipe

Base discounts on steel pipe, Pitts., Lorain, O., to consumers in carloads. Gary, Ind., 2 points less. Chicago delivered 2½ points less. Wrought pipe, Pittsburgh base.

Butt Weld

Steel

In.	Blk.	Gal.
¼ and ⅜	53½	35
½	58½	47
¾	62	52
1—3	64	55

Iron

½	31½	15
¾	36½	20½
1—1¼	39½	25½
2	41½	26

Lap Weld

Steel

2	60	51
2½—3	63	54
3½—6	65	56
7 and 8	64	54
9 and 10	63½	53½

Iron

2	37	22½
2½—3½	38	25
4—8	40	28½

Line Pipe

Steel

½, butt weld	57½
⅛-inch, butt weld	50½
¼—⅜, butt weld	52½
¾, butt weld	61
1—3, butt weld	63
2-inch, lap weld	59
2½—3, lap weld	62
3½—6, lap weld	64
7—8, lap weld	63

Iron

⅛—1½ inch, black and galv. take 4 pts. over; 2½—6 inch 2 pts. over discounts for same sizes, standard pipe lists, 8—12-inch, no extra.

Boiler Tubes

C. L. Discounts, f.o.b. Pitts.

Lap Weld Steel		Charcoal Iron	
2—2¼	33	1¾	8
2½—2¾	40	2—2¼	13
3	47	2½—2¾	16
3¼—3½	50	3	17
4	52	3¼—3½	18
4½—5	42	4	20
		4½	21

In lots of a carload or more, above discounts subject to preferential of two 5% and one 7½% discount on steel and 10% on charcoal iron.

Lapwelded steel: 200 to 9999 pounds, ten points under base, one 5% and one 7½%. Under 2000 pounds 15 points under base, one 5% and one 7½%. Charcoal iron: 10,000 pounds to carloads, base less 5%; under 10,000 lbs., 2 points under base.

Seamless Boiler Tubes

Under date of May 15 in lots of 40,000 pounds or more for cold-drawn boiler tubes and in lots of 40,000 pounds or feet or more for hot-finished boiler tubes, revised prices are quoted for 55 cold-drawn boiler tube sizes ranging from ¼ to 6-inch outside diameter in 30 wall thicknesses, decimal equivalent from 0.035 to 1.000, on a dollars and cents basis per 100 feet and per pound. Less-carloads revised as of July 1, 1935 card.

Hot-finished carbon steel boiler tube prices also under date of May 15 range from 1 through 7 inches outside diameter, inclusive, and embrace 47 size classifications in 22 decimal wall thicknesses ranging from 0.109 to 1.000, prices also being on a lb. and 100 ft. basis.

Seamless Tubing

Cold drawn; f.o.b. mill disc.

100 ft. or 150 lbs.	32%
15,000 ft. or 22,500 lbs.	70%

Cast Iron Water Pipe

Class B Pipe—Per Net Ton

6-in. & over, Birm.	$39.00-40.00
4-in., Birmingham	42.00-43.00
4-in., Chicago	50.40-51.40
6 to 24-in. Chicago	47.40-48.40
6-in. & over, east fdy.	43.00
Do., 4-in.	46.00

Class A pipe $3 over Class B. Stnd. fitgs., Birm. base...$100.00

Semifinished Steel

Billets and Blooms

4 x 4-inch base; gross ton

Pitts., Chi., Cleve., and Youngstown	$27.00
Philadelphia	32.67
Duluth	31.00
Forging, Pitts., Chi. and Buffalo	32.00
Forging, Duluth	36.00

Sheet Bars

Pitts., Cleve., Young., Chi., Buff., Canton, Sparrows Pt.	28.00

Slabs

Pitts., Cleve., Young.	27.00

Wire Rods

(Common; combination up $2)

Pitts., Cleveland	38.00
Chicago	39.00
Worcester, Mass.	40.00

Skelp

Pitts., Chi., Young., Buff., Coatesville, Sparrows Point	1.70c

Coke

Price Per Net Ton

Beehive Ovens

Connellsville, fur.	$3.40- 3.60
Connellsville, fdry.	4.60
Connel. prem. fdry.	5.10- 5.35
New River fdry.	6.00
Wise county fdry.	4.45- 5.00
Wise county fur.	4.00- 4.50

By-Product Foundry

Newark, N. J., del.	9.20- 9.65
Chi., ov., outside del.	8.50
Chicago, del.	9.25
New England, del.	11.00
St. Louis, del.	9.25
Birmingham, ovens	6.00
Indianapolis, del.	8.75
Cincinnati, del.	9.30
Cleveland, del.	9.25
Buffalo, ovens	7.50- 8.00
Detroit ov., out. del.	8.50
Philadelphia, del.	9.03

Coke By-Products

Per gallon, producers' plants.

	Tank lots	Spot
Pure and 90% benzol	15.00c	
Toluol	30.00c	
Solvent naphtha	30.00c	
Commercial xylol	30.00c	

Per lb. f.o.b. New York.

Phenol (200 lb. drums)	16.30c
Do. (100 lbs.)	17.30c

Eastern Plants, per lb.

Naphthalene flakes and balls, in bbls., to jobbers	4.50c

Per 100 lb. Atlantic seaboard

Sulphate of ammonia	$1.20

†Western prices, ½-cent up.

Pig Iron

Delivered prices include switching charges only as noted. No. 2 foundry is 1.75-2.25 sil.; 25c diff. for each 0.25 sil. above 2.25; 50c diff. for each 0.25 below 1.75. Gross tons.

Basing Points:	No. 2 Fdry.	Malleable	Basic	Bessemer
Bethlehem, Pa.	$19.50	$20.00	$19.00	$20.50
Birdsboro, Pa.	19.50	20.00	19.00	20.50
Birmingham, Ala., southern del.	14.50	14.50	13.50	19.00
Buffalo	18.50	19.00	17.50	19.50
Chicago	18.50	18.50	18.00	19.00
Cleveland	18.50	18.50	18.00	19.00
Detroit	18.50	18.50	18.00	19.00
Duluth	19.00	19.00	.....	19.50
Erie, Pa.	18.50	19.00	18.00	19.50
Everett, Mass.	19.50	20.00	19.00	20.50
Hamilton, O.	18.50	18.50	18.00	19.00
Jackson, O.	20.25	20.25	19.75	.....
Neville Island, Pa.	18.50	18.50	18.00	19.00
Provo, Utah	17.50	.....	17.00	.....
Sharpsville, Pa.	18.50	18.50	18.00	19.00
Sparrows Point, Md.	19.50	.....	19.00	.....
Swedeland, Pa.	19.50	20.00	19.00	20.50
Toledo, O.	18.50	18.50	18.00	19.00
Youngstown, O.	18.50	18.50	18.00	19.00
Delivered from Basing Points:				
Akron, O., from Cleveland	19.76	19.76	19.26	20.26
Baltimore from Birmingham	20.08	.....	18.96	.....
Boston from Birmingham	19.62	.....	19.50	.....
Boston from Everett, Mass.	20.00	20.50	19.50	21.00
Boston from Buffalo	20.00	20.50	19.50	21.00
Brooklyn, N. Y., from Bethlehem	21.93	22.43	.....	.....
Brooklyn, N. Y., from Bmghm.	21.55	.....	.....	.....
Canton, O., from Cleveland	19.76	19.76	19.26	20.26
Chicago from Birmingham	†18.72	.....	18.60	.....
Cincinnati from Hamilton, O.	19.51	19.51	19.01	.....
Cincinnati from Birmingham	19.38	.....	19.40	.....
Cleveland from Birmingham	19.04	.....	18.92	.....
Indianapolis from Hamilton, O.	20.93	20.93	20.43	21.43
Mansfield, O., from Toledo, O.	20.26	20.26	19.76	20.76
Milwaukee from Chicago	19.57	19.57	19.07	20.07
Muskegon, Mich., from Chicago, Toledo or Detroit	21.60	21.60	21.10	22.10
Newark, N. J., from Birmingham	20.61	.....	.....	.....
Newark, N. J., from Bethlehem	20.99	21.49	.....	.....
Philadelphia from Birmingham	19.93	.....	19.1	.....
Philadelphia from Swedeland, Pa.	20.31	20.81	19.81	.....
Pittsburgh district from Neville Island	Neville base plus 67c, 81c and $1.21 switching charges			
Saginaw, Mich., from Detroit	20.75	20.75	20.25	20.25

Delivered from Basing Points:	No. 2 Fdry.	Malleable	Basic	Bessemer
St. Louis, northern	19.00	19.00	18.50	.....
St. Louis from Birmingham	†18.62	.....	18.50	.....
St. Paul from Duluth	20.94	20.94	.....	21.44

†Over 0.70 phos.

Low Phos

Basing Points: Birdsboro and Steelton, Pa., and Standish, N. Y., $23.50. Phila. base, standard and copper bearing, $24.63.

Gray Forge		Charcoal	
Valley furnace	18.00	Lake Superior fur.	21.00
Pitts. dist. fur.	18.00	Do., del. Chicago	24.25
		Lyle, Tenn.	21.50

Silvery†

Jackson County, O., base; 6% $22.75; 7—$23.75; 8—$24.75; 9—$25.70; 10—$26.75; 11—$27.75. Buffalo base prices, up $1.25.

Bessemer Ferrosilicon†

Jackson County, O., base; 10%—$27.75; 11—$28.75; 12—$30.25; 13—$31.75; 14—$33.25; 15—$34.75; 16—$36.25. Buffalo base prices $1.25 higher.

†The lower all-rail delivered price from Jackson, O., or Buffalo is quoted with freight allowed.

Refractories

Per 1000 f.o.b. Works

Fire Clay Brick

First Quality.

Pa., Ill., Ky., Md., Ga., Mo.	$45.00
Alabama	45.00

Second Quality

Pa., Ill., Ky., Md., Mo., Ga., Ala.	40.00

Ohio

First quality	$40.00-45.00
Intermediary	37.00
Second quality	28.00

Malleable Bung Brick

All bases	50.00

Silica Brick

Pennsylvania	$45.00
Joliet, E. Chicago	54.00
Birmingham, Ala.	52.00

Magnesite

Imported dead-burned grains, net ton f.o.b. Chester, Pa., and Baltimore bases (bags)	$45.00
Domestic dead-burned grains, net ton f.o.b. Chester, Pa., and Baltimore bases (bags)	40.00
Domestic dead-burned gr. net ton f.o.b. Chewelah, Wash. (bulk)	22.00

Basic Brick

Net ton, f.o.b. Baltimore, Plymouth Meeting, Chester, Pa.

Chrome brick	$45.00
Chemically bonded chrome brick	42.50
Magnesite brick	65.00
Chemically bonded magnesite brick	55.00

Fluorspar, 85-5

Washed gravel, duty paid, tide, net ton	$18.75-19.00
Washed gravel, f.o.b. Ill., Ky., net ton, carloads	$13.00-14.00

Ferroalloys

Dollars, except Ferrochrome

Ferromanganese, 78-82% tidewater, duty paid	85.00
Do., Balti. base	85.00
Do., del. Pittsburgh	90.13
Spiegeleisen, 19-20% dom. Palmerton, Pa., spot†	26.00
Do., New Orleans	26.00
Ferrosilicon, 50% freight all., cl.	77.50
Do., less carload	85.00
Do., 75 per cent	126-130.00
Spot, $5 a ton higher.	
Silicomang., 2½ carb.	90.00
2% carbon, 95.00; 1%,	105.00
Ferrochrome, 66-70 chromium, 4-6 carbon, cts. lb. con. del.	10.00
Ferrotungsten, stand., lb. cont. del.	1.35- 1.45
Ferrovanadium, 35 to 40% lb., cont., on analysis	2.70- 2.90
Ferrotitanium, c. l., prod. plant, frt. allow., net ton	137.50
Spot, 1 ton, frt. allow., lb.	7.00
do., under 1 ton	7.50
Ferrophosphorus, per ton, c. l., 17-19% Rockdale, Tenn., basis, 18%, $2 unitage	50.00
Ferrophosphorus, electrolytic, per ton c. l., 23-26% f.o.b. Anniston, Ala., 24% $2.75 unitage	65.00
Ferromolybdenum, stand. 55-65%, lb.	0.95
Molybdate, lb. cont.	0.80

†Carloads, Quan. diff. apply

Nonferrous Prices

METAL PRICES OF THE WEEK

Spot unless otherwise specified. Cents per pound

	Copper: Electro, del. Conn.	Copper: Lake, del. Midwest	Copper: Casting, refinery	Straits Tin: New York Spot	Straits Tin: New York Futures	Lead: N. Y.	Lead: East St. L.	Zinc: St. L.	Aluminum 99%	Antimony: Chinese Spot, N. Y.	Nickel: Cathodes
June 22	9.00	9.12½	8.00	50.95	50.20	4.00	3.85	4.30	*19.00	12.75	35.00
June 24	9.00	9.12½	8.00	51.05	50.35	4.00	3.85	4.30	*19.00	12.75	35.00
June 25	9.00	9.12½	8.00	51.25	50.50	4.00	3.85	4.30	*19.00	12.75	35.00
June 26	9.00	9.12½	8.00	51.62½	50.55	4.00	3.85	4.30	*19.00	12.75	35.00
June 27	8.00	8.12½	7.25	51.75	50.85	4.00	3.85	4.30	*19.00	12.75	35.00
June 28	8.00	8.12½	7.25	51.75	50.80	4.00	3.85	4.30	*19.00	12.75	35.00

*Nominal range 19.00 to 21.00c.

MILL PRODUCTS

F.o.b. mill base, cents per lb. except as specified. Copper brass products based on 9.00c Conn. copper.

Sheets	
*Yellow brass (high)	13.62½
*Copper, hot rolled	15.00
Lead, cut to jobbers	7.75
Zinc, 100-lb. base	9.50
Tubes and Pipes	
*High yellow brass	15.37½
*Seamless copper	15.25
Rods	
*High yellow brass	12.12½
*Copper, hot rolled	12.50
Anodes	
*Copper, untrimmed	12.75
Wire	
*Yellow brass (high)	13.87½

OLD METALS

Dealers' buying prices, cents lb.

No. 1 Composition Red Brass	
New York	4.25- 4.50
*Cleveland	4.00- 4.50
Chicago	4.25- 4.50
*St. Louis	4.50- 4.75
Heavy Copper and Wire	
New York, No. 1	5.50- 5.75
*Chicago, No. 1	5.25- 5.50
*Cleveland	4.75- 5.00
*St. Louis, No. 1	5.50- 5.75
Composition Brass Borings	
New York	3.87½-4.12½
Light Copper	
New York	4.25- 4.50
*Chicago	3.75- 4.00
*Cleveland	3.75- 4.00
*St. Louis	4.50- 4.75
Light Brass	
*Chicago	2.00- 2.25
*Cleveland	2.00- 2.25
St. Louis	2.25- 2.50
Lead	
New York	3.00- 3.12½
Cleveland	2.75- 3.00
Chicago	2.75- 3.00
St. Louis	3.00- 3.25
Zinc	
New York	2.00- 2.25
Cleveland	2.00- 2.25
St. Louis	2.50- 2.65
Aluminum	
Borings, Cleveland	7.50- 8.00
Mixed, cast, Cleve.	12.00-12.50
Mixed, cast, St. L.	11.75-12.00
Clips, soft, Cleve.	13.50-14.00

SECONDARY METALS

Brass ingot, 85-5-5-5	8.00
Stand. No. 12 alum.	16.00-17.00

Iron and Steel Scrap Prices

Corrected to Friday night Gross tons delivered to consumers, except where otherwise stated

HEAVY MELTING STEEL

Birmingham	8.50- 9.00
Boston, dock, expt.	8.50
Boston, domestic	7.00- 7.25
Buffalo, No. 1	10.75-11.25
Buffalo, No. 2	9.25- 9.75
Chicago, No. 1	9.75-10.25
Cleveland, No. 1	9.00- 9.50
Cleveland, No. 2	8.50- 9.00
Detroit, No. 1	8.00- 8.50
Detroit, No. 2	7.00- 7.50
Eastern Pa., No. 1	10.00-10.50
Eastern Pa., No. 2	9.50
Federal, Ill.	8.00- 8.50
Granite City, R. R.	8.50- 9.00
Granite City, No. 2	7.25- 7.75
N. Y., deal, No. 2	7.50
N. Y., deal, barge	8.50
Pittsburgh, No. 1	11.75-12.25
Pittsburgh, No. 2	10.25-10.75
St. Louis	7.50- 8.00
Valleys, No. 1	11.50-12.00

COMPRESSED SHEETS

Buffalo, dealers	9.25- 9.75
Chicago, factory	8.50- 9.00
Chicago, dealer	7.50- 8.00
Cleveland	8.00- 8.50
Detroit	8.50- 9.00
E. Pa., new mat.	10.00
Pittsburgh	11.75-12.25
St. Louis	6.25- 6.75
Valleys	11.00-11.50

BUNDLED SHEETS

Buffalo	7.00- 7.50
Cincinnati, del.	6.00- 6.50
Cleveland	6.00- 6.50
Pittsburgh	10.25-10.75
St. Louis	4.50- 5.00

SHEET CLIPPINGS, LOOSE

Chicago	6.00- 6.50
Cincinnati	5.50- 6.00
Detroit	5.00- 5.50
St. Louis	4.25- 4.75

STEEL RAILS, SHORT

Birmingham	12.00-12.50
Buffalo	13.00-13.50
Chicago (3 ft.)	12.50-13.00
Chicago (2 ft.)	13.00-13.50
Cincinnati, del.	11.00-11.50
Detroit	10.50-11.00
Pitts., open-hearth, 3 ft. and less	14.00-14.50
St. Louis, 2 ft. & less	12.00-12.50

STEEL RAILS, SCRAP

Boston	7.50- 8.00
Chicago	9.75-10.25
Pittsburgh	13.00-13.50
St. Louis	9.75-10.25

STOVE PLATE

Birmingham	5.75- 6.00
Boston, dealers	3.50- 3.75
Buffalo	9.25- 9.75
Chicago, net	6.00- 6.50
Cincinnati, dealers	5.50- 6.00
Detroit, net	5.75- 6.25
Eastern Pa.	8.50
N. Y., deal, fdry.	6.00
St. Louis	5.50- 6.00

COUPLERS, SPRINGS

Buffalo	12.75-13.25
Chicago, springs	11.50-12.00
Eastern Pa.	13.50
Pittsburgh	14.50-15.00
St. Louis	8.50- 9.00

ANGLE BARS—STEEL

Chicago	12.00-12.50
St. Louis	9.50-10.00

RAILROAD SPECIALTIES

Chicago	11.50-12.00

LOW PHOSPHORUS

Buffalo, billets and bloom crops	12.75-13.25
Cleveland, billet, bloom crops	14.00-14.50
Eastern Pa., crops	13.00-14.00
Pittsburgh, billet, bloom crops	15.00-15.50
Pittsburgh, sheet bar crops	13.50-14.00

FROGS, SWITCHES

Chicago	10.00-10.50
St. Louis, cut	9.75-10.25

SHOVELING STEEL

Chicago	9.75-10.25
Federal, Ill.	7.50- 8.00
Granite City, Ill.	7.50- 8.00

RAILROAD WROUGHT

Birmingham	8.00- 8.50
Boston, dealers	6.00- 6.50
Buffalo, No. 1	9.25- 9.75
Buffalo, No. 2	10.75-11.25
Chicago, No. 1, net	8.50- 9.00
Chicago, No. 2	9.75-10.25
Cincinnati, No. 2	7.50- 8.00
Eastern Pa.	10.50-11.00
N. Y., No. 1, deal	7.25- 7.75
St. Louis, No. 1	6.50- 7.00
St. Louis, No. 2	8.25- 8.75

SPECIFICATION PIPE

Boston	3.00- 3.25
Eastern Pa.	9.00- 9.50
New York, dealers	3.50- 4.00

BUSHELING

Buffalo, No. 1	9.25- 9.75
Chicago, No. 1	8.50- 9.00
Cinci., No. 1, deal	6.00- 6.50
Cincinnati, No. 2	3.00- 3.50
Cleveland, No. 2	6.00- 6.50
Detroit, No. 1, new	7.00- 7.50
Valleys, new, No. 1	10.50-11.00

MACHINE TURNINGS

Birmingham	3.50- 4.00
Boston, dealers	1.75- 2.00
Buffalo	4.50- 5.00
Chicago	5.00- 5.50
Cincinnati, dealers	3.50- 4.00
Cleveland	5.00- 5.50
Detroit	4.50- 5.00
Eastern Pa.	6.00- 6.50
New York, dealers	2.00- 2.25
Pittsburgh	8.00- 8.50
St. Louis	2.25- 2.75
Valleys	8.25- 8.50

BORINGS AND TURNINGS

For Blast Furnace Use

Boston, dealers	3.25- 3.50
Buffalo	6.00- 6.50
Cincinnati, dealers	3.50- 4.00
Cleveland	6.00- 6.50
Detroit	4.75- 5.25
Eastern Pa.	5.00
New York, dealers	1.50- 1.75
Pittsburgh	6.50- 7.00

CAST IRON BORINGS

Birmingham, plain	3.50- 4.00
Boston, chemical	5.50- 6.50
Boston, dealers	3.25- 3.50
Buffalo	6.00- 6.50
Chicago	5.00- 5.50
Cincinnati, dealers	3.50- 4.00
Cleveland	6.50- 7.00
Detroit	4.75- 5.25
E. Pa., chemical	11.00-12.00
New York, dealers	1.50- 1.75
St. Louis	2.00- 2.50

PIPE AND FLUES

Cincinnati, dealers	5.00- 5.50

RAILROAD GRATE BARS

Buffalo	7.50- 8.00
Chicago, net	6.00- 6.50
Cincinnati	4.00- 4.50
Eastern Pa.	8.50
New York, dealers	4.00- 4.50
St. Louis	4.50- 5.00

FORGE FLASHINGS

Boston, dealers	4.50
Buffalo	9.25- 9.75
Cleveland	8.00- 8.50
Detroit	7.00- 7.50
Pittsburgh	10.00-10.50

FORGE SCRAP

Boston, dealers	4.50
Chicago, heavy	10.50-11.00
Eastern Pa.	9.50-10.00

ARCH BARS, TRANSOMS

St. Louis	10.00-10.50

AXLE TURNINGS

Boston, dealers	3.00- 3.50
Buffalo	7.50- 8.00
Chicago, elec. fur.	9.50-10.00
Cleveland	7.00- 7.50
Eastern Pa.	9.50
St. Louis	7.00- 7.50

STEEL CAR AXLES

Birmingham	12.00-12.50
Boston, ship. point.	10.00-10.50
Buffalo	12.50-13.00
Chicago, net	12.50-13.00
Eastern Pa.	16.00
St. Louis	12.00-12.50

SHAFTING

Boston, ship. point.	12.00-12.25
Eastern Pa.	17.50
New York, dealers	13.00-13.25
St. Louis	11.00-11.50

CAR WHEELS

Birmingham	9.00-10.00
Boston, iron deal	5.25- 5.50
Buffalo, iron	11.00-11.50
Buffalo, steel	12.75-13.25
Chicago, iron	10.00-10.50
Chicago, rolled steel	10.75-11.25
Cincinnati, iron	8.00- 8.50
Eastern Pa., iron	11.00
Eastern Pa., steel	13.50
Pittsburgh, iron	12.00-12.50
Pittsburgh, steel	14.50-15.00
St. Louis, iron	8.00- 8.50
St. Louis, steel	10.75-11.25

NO. 1 CAST SCRAP

Birmingham	8.50- 9.50
Boston, No. 1 mach.	8.50- 9.00
Boston, No. 2	7.50- 8.00
Boston, tex. con.	8.50- 9.00
Buffalo, cupola	10.75-11.25
Buffalo, mach.	11.50-12.00
Chicago, agri. net	7.50- 8.00
Chicago, auto	9.00- 9.50
Chicago, mach. net	9.00- 9.50
Chicago, railr'd net	8.00- 8.50
Cinci., mach. cup	8.50- 9.00
Cleveland, cupola	11.50-12.00
Detroit, net	9.50-10.00
Eastern Pa., cupola	11.00-12.00
E. Pa., mixed yard	8.50- 9.50
Pittsburgh, cupola	13.50-14.00
San Francisco, del.	13.50-14.00
Seattle	7.00- 8.50
St. Louis, No. 1	8.00- 8.50
St. L., No. 1 mach.	9.00- 9.50

HEAVY CAST

Boston, del.	5.25- 5.50
Buffalo, break.	8.50- 9.00
Cleveland, break.	7.50- 8.00
Detroit, No. 1, mach. net	10.00-10.50
Detroit, break.	7.00- 7.50
Detroit, auto net	10.50-11.00
Eastern Pa.	10.50-11.00
N. Y., break. deal	6.25- 6.50
Pittsburgh	11.50-12.00

MALLEABLE

Birmingham, R. R.	10.50-11.00
Boston, consum.	12.00-12.50
Buffalo	13.00-13.50
Chicago, R. R.	13.00-13.50
Cincinnati, agri. del.	8.50- 9.00
Cleveland, rail	12.00-12.50
Detroit, auto	10.00-10.50
St. Louis, R. R.	10.75-11.25
Eastern Pa., R. R.	11.00-11.50

RAILS FOR ROLLING

5 feet and over

Birmingham	10.50-11.00
Boston, dealers	8.00- 8.50
Buffalo	11.00-11.50
Chicago	10.50-11.00
Eastern Pa.	12.50-13.00
New York, dealer	7.50- 8.00
St. Louis	10.00-10.50

LOCOMOTIVE TIRES

Chicago (cut)	11.50-12.00
St. Louis, No. 1	9.00- 9.50

LOW PHOS. PUNCHINGS

Buffalo	12.50-13.00
Chicago	12.00-12.50
Eastern Pa.	13.00-14.00
Pittsburgh (heavy)	13.50-14.00
Pittsburgh (light)	13.00-13.50

Iron Ore

Lake Superior Ore

Gross ton, 51½% Lower Lake Ports

Old range bessemer	$4.80
Mesabi nonbess.	4.50
High phosphorus	4.40
Mesabi bessemer	4.65
Old range nonbess.	4.65

Eastern Local Ores

Cents, unit, del. E. Pa.

Foundry and basic 56-63% con. (nom.)	8.00- 9.00
Cop.-free low phos. 58-60% (nom.)	10.00-10.50

Foreign Ore

Cents per unit, f.a.s. Atlantic ports (nominal)

Foreign manganiferous ore, 45.55% iron, 6-10% man.	10.00
No. Afr. low phos.	10.00
Swedish basic, 65%	9.00
Swedish low phos.	10.00
Spanish No. Africa basic, 50 to 60%	9.00
*Tungsten, spot, sh. ton unit, duty pd.	$15.50-16.00
N. F. fdy., 55%	7.00
Chrome ore, 48% gross ton, c.i.f.	$18.00-19.50

Manganese Ore

(Nominal)

Prices not including duty, cents per unit cargo lots.

Caucasian, 52-55%	26.00
So. African, 52%	26.00
So. Afr., 49-51%	24.00
Indian, 58-60%	nominal
Indian, 48-50%	nominal

Warehouse Iron and Steel Prices

Cents per pound for delivery within metropolitan districts of cities specified

STEEL BARS

Baltimore*	2.95c
Boston††	3.00c
Buffalo	3.00c
Chattanooga	3.31c
Chicago	2.95c
Cincinnati	3.17c
Cleveland	2.95c
Detroit	3.04c
Houston	3.00c
Los Angeles	3.60c
Milwaukee	3.06c
New Orleans	3.30c
New York‡(d)	3.26c
Pittsburgh (h)	2.90c
Philadelphia*	2.93c
San Francisco	3.60c
Seattle	3.60c
St. Louis	3.19c
St. Paul	3.00c
Tulsa	3.25c

IRON BARS

Portland	3.40c
Chattanooga	3.31c
Baltimore*	3.05c
Chicago	2.75c
Cincinnati	3.17c
New York‡(d)	3.36c
Philadelphia*	2.93c
St. Louis	3.19c
Tulsa	3.25c

REINFORCING BARS

Buffalo	2.60c
Chattanooga	3.31c
Chicago	2.10c-2.60c
Cleveland (c)	2.10c
Cincinnati	3.25c
Houston	3.25c
Los Ang., cl.	2.45c
New Orleans	3.50c
Pitts., plain (h)	3.05c
Pitts., twisted squares (h)	3.175c
San Francisco	2.45c
Seattle	2.45c
St. Louis	3.24c
Tulsa	3.25c
Young.	2.30c-2.60c

SHAPES

Baltimore*	3.00c
Boston††	3.19c
Buffalo	3.25c
Chattanooga	3.56c
Chicago	3.20c
Cincinnati	3.42c
Cleveland	3.31c
Detroit	3.42c
Houston	3.00c
Los Angeles	3.60c
Milwaukee	3.31c
New Orleans	3.55c
New York(d)	3.37c
Philadelphia*	2.98c
Pittsburgh(h)	3.15c
Portland	3.55c
San Francisco	3.55c
Seattle	3.55c
St. Louis	3.44c
St. Paul	3.25c
Tulsa	3.50c

PLATES

Baltimore*	3.00c
Boston††	3.21c
Buffalo	3.37c
Chattanooga	3.56c
Chicago	3.20c
Cincinnati	3.42c
Cleveland, ¼-in. and over	3.31c
Detroit	3.42c
Detroit, ⅜-in.	3.65 c
Houston	3.00c
Los Angeles	3.60c
Milwaukee	3.31c
New Orleans	3.55c
New York(d)	3.40c
Philadelphia*	2.98c
Phila. floor	4.95c
Pittsburgh(h)	3.15c
Portland	3.55c
San Francisco	3.55c
Seattle	3.55c
St. Louis	3.44c
St. Paul	3.25c
Tulsa	3.50c

NO. 10 BLUE

Baltimore*	3.10c
Boston††	3.30c
Buffalo	3.62c
Chattanooga	3.36c
Chicago	3.05c
Cincinnati	3.22c
Cleveland	3.11c
Det., 8-10 ga.	3.14c
Houston	3.35c
Los Angeles	3.70c
Milwaukee	3.16c
New Orleans	3.55c
New York	3.31c
Portland	3.75c
Philadelphia*	3.08c
Pittsburgh(h)	2.95c
San Francisco	3.75c
Seattle	3.75c
St. Louis	3.29c
St. Paul	3.45c
Tulsa	3.70c

NO. 24 BLACK

Baltimore*†	3.60c
Boston (g)	3.95c
Buffalo	3.25c
Chattanooga	4.21c
Chicago	3.85c
Cincinnati	4.07c
Cleveland	3.91c
Detroit	3.94c
Los Angeles	4.35c
Milwaukee	3.96c
New York	3.89c
Philadelphia*†	3.60c
Pitts.** (h)	3.55c
Portland	4.40c
San Francisco	4.40c
Seattle	4.40c
St. Louis	4.09c
St. Paul	3.695c
Tulsa	4.75c

NO. 24 GALV. SHEETS

Baltimore*†	4.30c
Buffalo	4.00c
Boston (g)	4.65c
Chattanooga	4.86c
Chicago (h)	4.55c
Cincinnati	4.72c
Cleveland	4.61c
Detroit	4.72c
Houston	4.40c
Los Angeles	4.95c
Milwaukee	4.66c
New Orleans	4.50c
New York	4.50c
Philadelphia*†	4.30c
Pitts** (h)	4.15-4.45c
Portland	5.00c
San Francisco	5.00c
Seattle	5.00c
St. Louis	4.79c
St. Paul	4.19c
Tulsa	5.10c

BANDS

Baltimore*	3.20c
Boston††	3.30c
Buffalo	3.42c
Chattanooga	3.61c
Chicago	3.30c
Cincinnati	3.47c
Cleveland	3.36c
Detroit, ⅜-in. and lighter	3.39c
Houston	3.25c
Los Angeles	4.10c
Milwaukee	3.41c
New Orleans	3.95c
New York(d)	3.56c
Philadelphia	3.18c
Pittsburgh(h)	3.20c
Portland	4.25c
San Francisco	4.25c
Seattle	4.25c
St. Louis	3.54c
St. Paul	3.20c
Tulsa	3.45c

HOOPS

Baltimore	2.30c
Boston	4.30c
Buffalo	3.42c
Chicago	3.30c
Cincinnati	3.47c
Det., No. 14 and lighter	3.39c
Los Angeles	5.85c
Milwaukee	3.41c
New York	3.56c
Philadelphia	3.43c
Pittsburgh(h)	3.70c
Portland	5.60c
San Francisco	6.15c
Seattle	5.60c
St. Louis	3.54c
St. Paul	3.75c

COLD FIN. STEEL

Baltimore (c)	3.58c
Boston	3.75c-3.90c
Buffalo (h)	3.40c
Chattanooga*	3.98c
Chicago (h)	3.35c
Cincinnati	3.57c
Cleveland (h)	3.35c
Detroit	3.49c
Los Ang.(f) (d)	5.85c
Milwaukee	3.46c
New Orleans	4.15c
New York	3.81c-4.31c
Philadelphia	3.61c
Pittsburgh	3.20c
Portland (f) (d)	6.00c
San Fran.(f) (d)	5.95c
Seattle (f) (d)	6.00c
St. Louis	3.59c
St. Paul	3.05c
Tulsa	4.50c

COLD ROLLED STRIP

Boston, 0.100-in., 500 lb. lots	5.35c
Buffalo	3.39c
Chicago	3.27c
Cincinnati (b)	3.44c
Cleveland (b)	3.20c
Detroit	3.33c
New York	3.36c
St. Louis	3.36c

TOOL STEELS

(Applying on or east of Mississippi river; west of Mississippi 1c up)

	Base
High speed	57c
High carbon, high chrome	37c
Oil hardening	22c
Special tool	20c
Extra tool	17c
Regular tool	14c

Uniform extras apply

BOLTS AND NUTS

(100 pounds or over)

	Discount
Chicago (a)	70
Cleveland	70
Detroit	70–5
Milwaukee	70
Pittsburgh	70

(a) Under 100 pounds, 65 off.

(b) Plus straightening, cutting and quantity differentials; (c) Plus mill, size and quantity extras; (d) Minus quant. diff.; (e) New mill classif.; (f) Rounds only; (g) 50 bundles or over; (h) Outside delivery, 10c less.

‡Domestic bars; *Plus quan. extras; **Under 25 bundles; *†50 or more bundles; †New extras apply; ††Base 40,000 lbs., extras on less.

Prices on heavier lines are subject to new quantity differentials; 399 lbs. and less, up 50 cts.; 400 to 9999 lbs., base; 10,000 to 19,999 lbs., 15 cts. under; 20,000 to 39,999 lbs., 25 cts. under; 40,000 lbs. and over, 35 cts. under base.

Current Iron and Steel Prices of Europe

Dollars at Rates of Exchange, June 27

Export Prices f. o. b. Ship at Port of Dispatch—By Cable (or Radio)

	British gross tons U. K. ports £ s d	Continental Channel or North Sea ports, metric tons Quoted in dollars at current value	**Quoted in gold pounds sterling £ s d
PIG IRON			
Foundry, 2.50-3.00 Silicon	$15.47 3 2 6	$13.76	1 14 0
Basic bessemer	15.47 3 2 6*	12.95	1 12 0
Hematite, Phos. .03-.05	15.59 3 3 0	.....	.....
SEMIFINISHED STEEL			
Billets	$27.23 5 10 0	$19.02	2 7 0
Wire rods, No. 5 gage	42.08 8 10 0	36.44	4 10 0
FINISHED STEEL			
Standard rails	$38.36 7 15 0	$44.53	5 10 0
Merchant bars	1.66c 7 10 0	1.15c to 1.20c	3 2 6 to 3 5 0
Structural shapes	1.63c 7 7 6	1.14c	3 1 6
Plates, †¼ in. or 5 mm.	1.77c 8 0 0	1.51c	4 2 6
Sheets, black, 24 gage or 0.5 mm.	2.04c 9 5 0	2.13c	5 16 0††
Sheets, gal., 24 gage, corr.	2.44c 11 5 0	3.21c	8 15 0
Bands and strips	1.88c 8 10 0	1.46c	4 0 0
Plain wire, base	2.04c 9 5 0	1.96c	5 7 6
Galvanized wire, base	2.38c 10 15 0	2.29c to 2.33c	6 5 6 to 6 7 6
Wire nails, base	2.65c 12 0 0	2.11c	5 15 0
Tin plate, box 108 lbs.	$ 4.46 0 18 2	.....	.....

British ferromanganese $85 delivered Atlantic seaboard, duty-paid. German ferromanganese £9 0s 0d $(43.74) f.o.b.

Domestic Prices at Works or Furnace—Last Reported

	£ s d	French Francs		Belgian Francs		Reich Marks
Sdy. pig iron, Si. 2.5	$16.71 3 7 6(a)	$17.26	260	$12.51	370	$25.49 63
Basic bessemer pig iron	17.33 3 10 0(a)*	12.28	185	11.15	330	28.12 (b) 69.50
Furnace coke	4.08 0 16 6	7.97	120	3.72	110	7.69 19
Billets	27.23 5 10 0	28.55	430	18.25	540	39.04 96.50
Standard rails	1.82c 8 5 0	2.08c	694	1.65c	1,100	2.42c 132
Merchant bars	1.90c 8 12 0	1.68c	560	.90c	600	2.01c 110
Structural shapes	1.93c 8 15 0	1.65c	550	.90c	600	1.97c 107.50
Plates, †¼-in. or 5 mm.	2.00c 9 1 3	2.10c	700	1.05c	700	2.32c 127
Sheets, black	2.32c 10 10 0§	1.80c	600‡	1.24c	825‡	2.64c 144‡
Sheets, galv., corr., 24 ga. or 0.5 mm.	2.87c 13 0 0	3.81c	1,270	2.25c	1,500	6.77c 370
Plain wire	2.04c 9 5 0	3.39c	1,130	1.80c	1,200	3.17c 173
Bands and strips	2.07c 9 7 0	1.95c	650	1.26c	840	2.32c 127

*Basic. †British ship-plates. Continental, bridge plates. §24 ga. ‡1 to 3 mm. basic price British quotations are for basic open-hearth steel. Continental usually for basic-bessemer steel a del. Middlesbrough. b hematite. ††Close annealed

**Gold pound sterling carries a premium of 66.22 per cent over paper sterling.

Bars

Bar Prices, Page 62

Pittsburgh—Hot-rolled steel bar buying still is confined to small lots, but the aggregate volume has not greatly diminished in June compared with May. The market on merchant bars continues to be 1.80c, base, and on alloy bars, 2.45c, Pittsburgh.

Cleveland—While specifications from automobile manufacturers have declined sharply, those from agricultural implement producers are holding up much better than anticipated. Prices are firm.

Chicago—Despite some tapering in steel bar demand, business compares favorably with the rate of the preceding several weeks. Requirements of miscellaneous consumers are fairly stable, and farm implement manufacturers still provide considerable support. Soft steel bars continue steady at 1.85c, Chicago or Gary.

Boston—Steady, light buying marks demand for commercial steel, alloy and forging bars. Activity among the latter shops has declined largely due to automotive and airplane demand.

New York—Third quarter contracting for steel bars is being done lightly as most consumers are buying on a hand-to-mouth basis. Contract forms are the same as used heretofore except that all reference to the steel code is eliminated, for instance, extras are referred to as standard extras and not code extras. Some leading sellers report June tonnage greater than that of May.

Philadelphia—Commercial steel bar business continues on a hand-to-mouth basis, with general specifications light. Railroads are releasing little tonnage and specifications from bolt and nut makers are said to be as light as at any time this year. Demand for cold-finished bars is spotty. Prices are unchanged.

Plates

Plate Prices, Page 62

Philadelphia—Featuring the plate market is the issuance of specifications for 13 boats for the navy, all of which are to be built in private yards and on which construction bids will be opened August 7. These boats will require approximately 24,275 tons of steel, of which approximately two-thirds will be plates. Specifications will be brought out later for 11 boats to be built in the navy's own yards.

Ships to be built by private yards include one aircraft carrier requiring an estimated amount of 13,000 tons of steel; one light cruiser, requiring 6000 tons; three 1850-ton destroyers, each requiring about 735 tons; five 1500-ton destroyers, each requiring 525 tons; and three submarines each taking 150 tons.

Other ship work on which the award of steel is expected momentarily includes the Norfolk county ferry which has been placed with the Maryland Dry Docks Co., Baltimore, and which will require about 400 tons of steel, and the lightship to be built by Pusey & Jones, requiring a similar tonnage. This latter is expected to be placed with a local district mill.

Pittsburgh—If Ohio River Co., Cincinnati, recently noted as planning purchase of ten barges requiring 2300 tons of plates, receives an important coal hauling contract, it may likely increase its requirements to 30 barges and two or possibly three towboats. The present inquiry of Ohio River Co. for one towboat and ten barges involves 2650 tons of plates; therefore, it is likely that the inquiry may be increased to about 10,000 tons. Boiler shops have before them an inquiry for four boilers for Car-

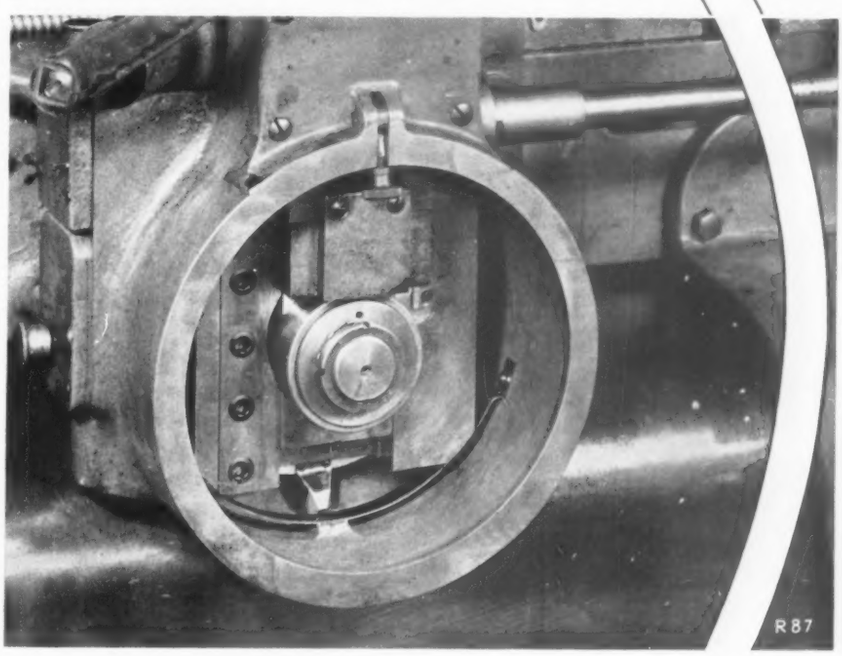
The mechanism below is just that. Built right into the Landis Type 30 Roll Grinder it is ever watchful that roll contours will without fail be symmetrically ground.

You may be certain that its principle of design is correct. Landis engineers with their years of experience have seen to this. It is built with precision for precision results. Landis mechanics whose labors have always been for greater precision have seen to this.

Roll contour symmetry—whether crowning or concaving—is something you are constantly striving for. From the Landis you get it. Should you doubt this statement, ask us for concrete proof. No. 178

The Source of Roll Contour Symmetry

THE CATALOG NO. IS H301



LANDIS TOOL CO.
WAYNESBORO, PA.

negie Steel Co.'s Ohio works, requiring 300 tons of plates.

Cleveland — Plate specifications continue light. Chesapeake & Ohio and Erie railroads during the week took bids on unstated plate, shape and bar requirements for third quarter. The 5125 Chesapeake & Ohio freight cars awarded will require 61,500 tons of plates, shapes and bars, and orders are expected to be distributed in about two weeks.

Chicago—Better plate demand is in prospect for heavy construction of a public nature and for railroad equipment building and repairs. A moderate tonnage of plates will be required for Mississippi river locks now on inquiry.

Boston—Plate buying is light, led by 285 tons for a fuel tank at New Haven, Conn., and navy yard requirements. Prices are firm at 2.22c, delivered Boston.

New York—Plate tonnage is disappointing to most sellers. A few fair tank jobs still pending and heavy navy work is up for figures. Prices are steady.

San Francisco—Bids have been rejected on the Mad River pipe line, Eureka, Calif., 1600 tons, and new bids will be called. The only award of size went to Southern Pipe & Casing Co., 185 tons for a 14-inch welded steel pipe line for the metropolitan water district, Los Angeles.

Seattle—Several important steel pipe jobs, including projects at Tacoma and Everett, Wash., are planned but are not up for figures yet. Small tank jobs are creating a fair volume for light gages.

Contracts Placed

500 tons, 22 station tanks for Atlantic Refining Co., Philadelphia, to Chicago Bridge & Iron Works, Chicago.

285 tons, 80,000-barrel tank, T. A. D. Jones & Co. Inc., New Haven, Conn., to Chicago Bridge & Iron Works, Chicago.

220 tons, foundation cylinders, Trinity church, Broadway, Lower Manhattan, New York, to Steel & Alloy Tank Co., Newark, N. J., 180 tons, Scully Steel Products Co., Jersey City, 40 tons.

185 tons, 14-inch welded pipe, specification 1710, metropolitan water district, Los Angeles, to Southern Pipe & Casing Co., Los Angeles.

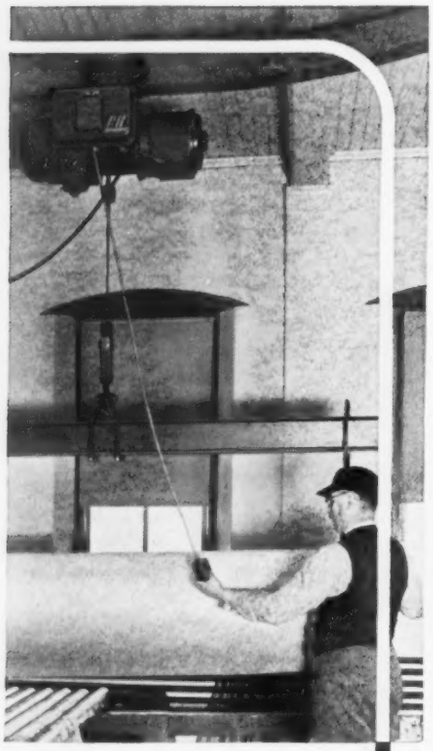
Unstated tonnage, steel barge for use in building Pickwick Dam, Tennessee valley authority, Knoxville, Tenn., to Nashville Bridge Co., Nashville, Tenn., $14,345.

Unstated tonnage, tank for filtration plant, Weymouth, Mass., to Chicago Bridge & Iron Works, Chicago.

Contracts Pending

16,000 tons, approximately, plates for 13 naval vessels, construction bids to be opened Aug. 7; will also require more than 8000 tons of shapes, bars and other steel products.

9500 to 10,000 tons, possible requirement of Ohio River Co., Cincinnati, in 30 barges and three towboats. (Inquiry for ten 175 x 35 x 11-foot steel



LITTLE DROPS
would cost
BIG MONEY here!
——— that's why
P&H HOISTS ARE USED

The paper used for currency and bank notes is expensive rag stock—it must be protected against damage from oil. That's why this New England manufacturer installed P&H Hoists. They're *drip-proof!*

It's only one feature of P&H's advanced line of hoists to give you safer, faster, more economical handling.

If you would cut down your costs, look to the newest, improved equipment. We have cases where P&H Hoists have reduced costs more than 65%. Think what that means in your overhead . . . in building a better product at a lower price.

P&H hoist engineers meet each material handling problem in the most practical and economical way. Ask one to study your requirements. If he can't save you money, he'll frankly tell you so. Write for a copy of Bulletin RH-2.

HARNISCHFEGER CORPORATION
4411 W. NATIONAL AVE., MILWAUKEE, WIS.

P&H MILWAUKEE ELECTRIC HOISTS

Who said ———
"TIME OUT"?
——— not these sturdy
P & H CONVERTIBLE MOTORS

When we designed these new P&H Convertible Motors, we compared every advantage and disadvantage of existing types. We put hard drawn copper rotor bars in straight semi-enclosed slots; we electrically brazed them to the end ring to make them indestructible; we put both sleeve and ball bearings in capsule mountings to seal them against dirt and dust for trouble-free service.

Then, we made these motors *convertible*. Standard interchangeable parts allow you to convert any of these P&H motors for open type, enclosed fan cooled, splash proof or totally enclosed applications. And this extra feature which protects you against costly replacements doesn't cost you a penny more.

Standard squirrel cage types are furnished for two and three phase, 110 to 2200 volt service with all standard frequencies—½ to 125 HP. Write for your copy of Bulletin HM-1.

HARNISCHFEGER CORPORATION
4411 W. NATIONAL AVE., MILWAUKEE, WIS.

P&H CONVERTIBLE MOTORS

barges and one 170-foot towboat, involving in total 2650 tons, noted in STEEL, June 24, 1935, for Ohio River Co.)

9000 to 10,000 tons, 30 large or 40 small steel barges, Mississippi River Barge Lines Co., St. Louis; original closing date for bids of July 1 postponed until July 5 or 8.

1600 tons, Mad River pipe line, Eureka, Calif.; new bids soon.

370 tons, pipe, penstocks, etc., Seminole dam, Casper, Wyo.; bids by bureau of reclamation, Casper, Wyo., July 22.

300 tons, four boilers, each requiring 75 tons of plates, new power house, Ohio works, Youngstown, O., Carnegie Steel Co., Pittsburgh.

200 tons, 20-inch steel pipe for Fort Mifflin, Pa.; bids asked by the United States engineer, Philadelphia.

Sheets

Sheet Prices, Page 62

Pittsburgh—Orders for sheets continue to decline. Advance specifications for fall automobile models are current. The average of all sheet mill operations last week was 45 to 50 per cent.

Cleveland—Operations are becoming more irregular, as specifications from automobile manufacturers are slow. The Cleveland mill last week operated at 80 per cent and a nearby lake mill also increased its schedule on an accumulation of orders. Demand for enameling sheets is quieter.

Chicago—Sheet demand is fairly steady but consumption in practically all industries is off from the rate of 30 to 60 days ago. Miscellaneous consumers still constitute an important factor in total demand.

Boston—Full car orders are fewer, industrial consumption being off. Sheet metal shops are working irregularly.

New York—Demand is less than two weeks ago. Snead & Co., Jersey City, N. J., are expected to close shortly on a substantial tonnage for the Library of Congress addition, Washington. New York Central will open bids July 2 on third quarter requirements of sheets and other products.

Buffalo—Buffalo district sheet mills will further reduce production this week. Operations in the last half of June averaged 60 to 65 per cent, off 10 to 15 points from the average in the first half.

Philadelphia—The Edward G. Budd Mfg. Co. announces that its third quarter requirements for Chevrolet car frames will be supplied by the Alan Wood Steel Co., Conshohocken, Pa. Budd officials were noncommital as to the disposition of the tonnage for the fourth and succeeding quarters, although the trade here assumes that the contract producer will be extended. More than 35,000 tons of heavy gage sheets will be required. Sheet tonnage in general is moving slowly at this time. Radio requirements are expected to expand moderately from now until October.

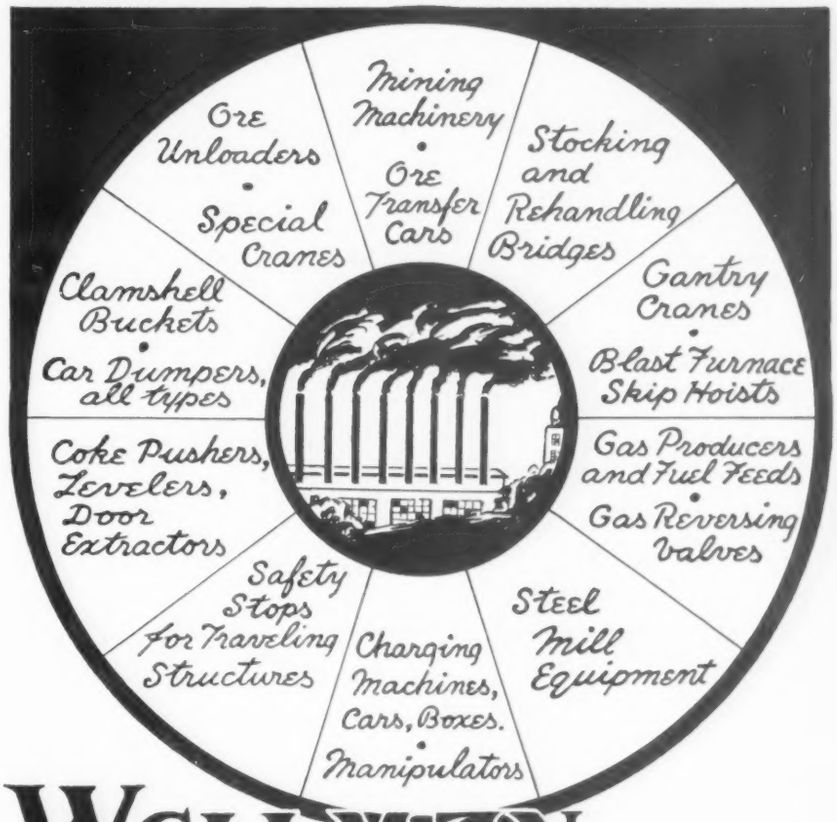
Cincinnati—Miscellaneous demand for sheets is holding up better than that for automotive needs. Prices are steady.

St. Louis—Distributors and manufacturers report recessionary trends. Requirements of manufacturers of household appliances are less in evidence than heretofore.

Transportation

Track Material Prices, Page 63

The purchase last week of 5125 freight cars by the Chesapeake & Ohio, details shown below, was the largest domestic freight car order since February, 1934, when the Van Sweringens closed on 12,725 cars. The recent purchase brings the total freight car awards this year to 6309, only 1182 having been placed during the first five months and but two

FROM ORE MINE TO FINISHED PRODUCT

WELLMAN EQUIPMENT for IRON and STEEL PRODUCTION

Also Welded Steel Construction, Castings and Machine Work to your Drawings.

Wellman Engineering contributes to greater efficiency, improved handling and production methods, and low cost operation . . . In fact, no other single manufacturer has equalled Wellman's accomplishments in serving this field. *Wellman installations are world-wide!*

THE WELLMAN ENGINEERING CO.
ENGINEERS CONSTRUCTORS MANUFACTURERS
WELLMAN
CLEVELAND, OHIO
BIRMINGHAM · NEW YORK · MEXICO CITY

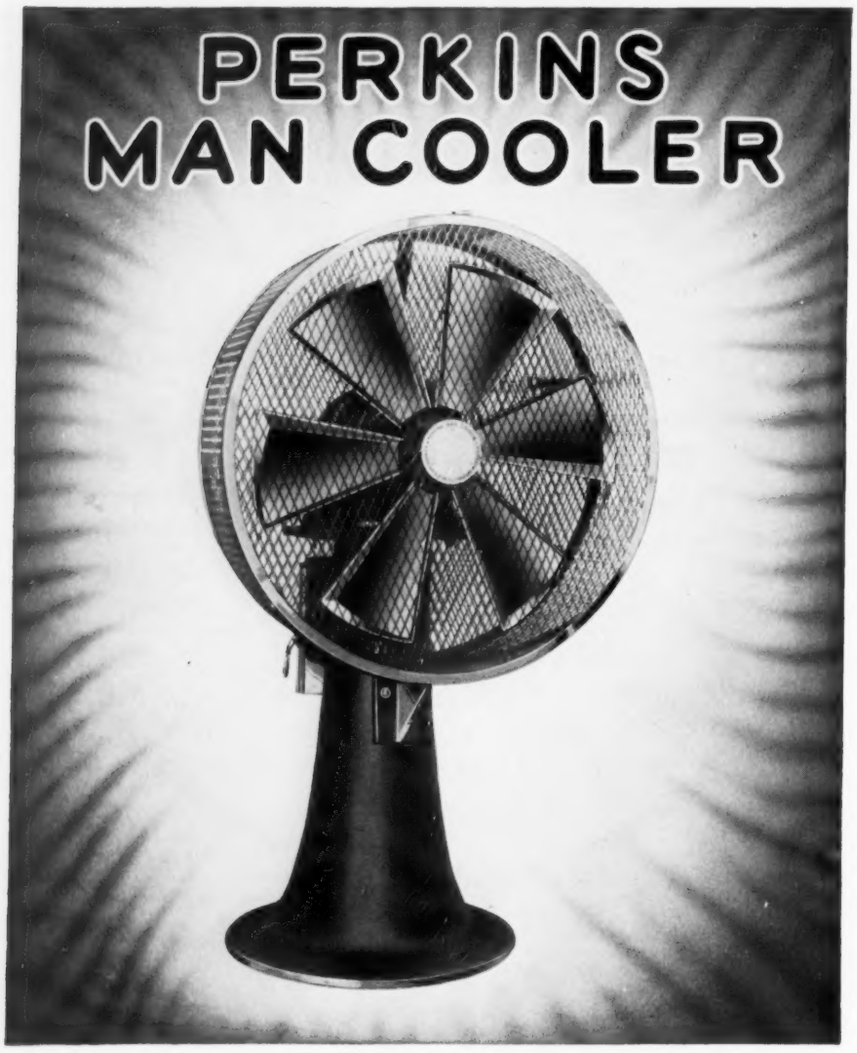
cars other than the Chesapeake & Ohio list in June. Final returns for first half may show a slightly larger total.

Action on the five locomotives for the Chesapeake & Ohio is expected this week.

The past week brought inquiries for freight and passenger cars for two Canadian railroads, the Canadian Pacific for 1200 cars and the Canadian National for 1100.

The Wabash has divided 5000 tons of rails among three mills. Rail mills at Pittsburgh and Chicago are working intermittently on small lots of rails, with little tonnage in sight. Public Service Co., St. Louis, has been authorized by the federal court to reconstruct 15 miles of street car track because of worn rails, but the fund of $550,234 is not yet available.

An eastern Pennsylvania road plans repairs to 100 to 200 coal cars. Brooklyn & Queens Transit Co. is reported to have placed 100 street car bodies with St. Louis Car Co., St. Louis, with trucks yet to be purchased. The company originally asked bids on alternate lots of 300 and 500 but it is believed 100 is all that will be bought.



PERKINS MAN COOLER blows heat away. Because cold air is not introduced from the outside its invigorating breeze does not chill. It produces refreshing recirculation of air of the same temperature in which the men are working.

B. F. PERKINS & SON, INC., Holyoke, Mass.
ENGINEERS AND MANUFACTURERS

Car Orders Placed

Chesapeake & Ohio, 5125 freight cars, distributed: 2000 50-ton steel hopper coal cars to the Huntington, W. Va., plant of American Car & Foundry Co., 1500 of the same type to the Butler, Pa., plant of Pullman-Standard Car Mfg. Co.; 1500 of the same and 50 40-ton stock cars to the East Chicago, Ind., plant of General American Tank Car Co.; and 75 steel underframe 50-ton flat cars to the Johnstown, Pa., plant of Bethlehem Steel Co.

United Carbon Co., two covered hopper cars for transporting carbon black, to American Car & Foundry Co., New York.

Rail Orders Placed

745 tons, 90-pound rail, 78 tons angle bars, Bonneville dam project, Oregon, to Columbia Steel Co., San Francisco; 225 tons bolts, spikes, tie plates to Colorado Fuel & Iron Co., Denver.

Wabash, 5000 tons; 2500 tons to Illinois Steel Co., Chicago, 1250 tons each to Inland Steel Co., Chicago, and Bethlehem Steel Co., Bethlehem, Pa.

Car Orders Pending

Canadian National, 400 automobile, 300 general service, 250 refrigerator and 150 sand cars.

Canadian Pacific, 750 box, 300 coal, 150 refrigerator; bids asked.

United Fruit Co., alternate lots of five, 10 or 15 passenger cars for export, bids asked.

Buses Booked

American Car & Foundry Motors Co., New York: Four 40-passenger street coaches for Boston Elevated railways; two 28 passenger street buses for Boston, Worcester & New York Street Railway Co., Framingham, Mass.; two 23-passenger parlor cars for Mason Coach lines, North Reading, Mass.; one 50-passenger street coach for Connecticut Co., New Haven, Conn.; One 29-passenger parlor car for Windsor-Chatham-London Coach Lines Ltd., Windsor, Ont.; one 28-passenger parlor car, for Frank Martz Coach Co., Wilkes-Barre, Pa.; one 36-passenger parlor car for Southeastern Greyhound lines, Lexington, Ky.; one 30-passenger street coach for Mastco Co. Inc., New Britain, Conn.

Twin Coach Corp., Kent, O.: Six 23-passenger for Northern Texas Traction Co., Fort Worth, Tex.; six 23-passenger for Duluth-Superior Bus Co., Superior, Wis.; five 22-passenger for Gloucester Auto Bus Co., Gloucester, Mass.; five 30-passenger for Reading Coach Co., Reading, Pa.; four 29-passenger for Groton & Stoington Traction Co., New London, Conn.; four 38-passenger for Boston Elevated Railway, Boston; four 23-passenger for Columbus Railway, Power & Light Co., Columbus, O.; three 23-passenger for Southwest Missouri Railroad Co., Joplin, Mo.; three 23-passenger for Auto Interurban Co., Spokane; three, various sizes, for Washington, Virginia & Maryland Coach Co., Clarendon, Va.; three 26-passenger for Kahului Railroad Co., Maui, T. H.; two 30-passenger for Erie County Motor Coach Lines Inc., Buffalo; two 23-passenger for Burlington Rapid Transit Co., Burlington, Vt.

Pipe

Pipe Prices, Page 63

Pittsburgh — Williams Bros., Tulsa, Okla., have general contract for construction of a 162-mile natural gas pipeline from Glenda, Wyo., to Bridgeport, Nebr., for the New York Oil Co., Denver, subsidiary of North Central Gas Co. Construction, expected to start about Aug. 1, will require 60 miles of 12-inch, 61 miles of 10-inch, 9 miles of 8-inch, 18 miles of 6-inch, and 14 miles of 3½-inch line pipe. Plans call for as much used pipe as possible, but some new pipe will be needed.

Chicago — Cast pipe demand continues disappointingly slow, with business remaining less active than a year ago.

Boston — Cast pipe business continues light and below expectations.

New York — Largest inquiry for cast pipe in months, 5000 tons of cement-lined, with fittings, for New York city closes with the department of water supply, gas and electricity July 1.

Philadelphia—A leading district tube mill is operating three shifts, largely on specifications from Texas oil fields.

Birmingham, Ala. — With bids in on several contracts, pipe producers here are confident of higher production shortly.

San Francisco—A number of fair sized lots of cast pipe have been placed and several large lots are now up for figures or pending. Awards for the year, so far, aggregate 21,524 tons, compared with 13,895 tons for the corresponding period in 1934.

Seattle—New projects are slow in developing and few specifications are out, although extended water system improvements are planned in the Pacific northwest.

Cast Pipe Placed

300 tons, fittings, Chicago, 200 tons to Lynchburg Foundry Co., Lynchburg, Va., 100 tons to James B. Clow & Son, Chicago.

232 tons, 8 and 12-inch, San Bernardino, Calif., allocated as follows: 121 tons, 12-inch, to R. D. Wood & Co., Philadelphia, and 111 tons, 8-inch, to United States Pipe & Foundry Co., Burlington, N. J.

165 tons, 4 and 6-inch, Woodruff, Utah, to Pacific States Cast Iron Pipe Co., Provo, Utah.

Cast Pipe Pending

5000 tons, 6 to 20-inch, cement-lined with fittings, department of water supply, gas and electricity, New York; bids July 1. Material is for yard stocks with delivery to all five boroughs.

1250 tons, 12-inch, Price, Utah; bonds voted.

127 tons, 6-inch, class 150, San Francisco; bids in.

125 tons, 8 and 12-inch, Fifty-sixth avenue improvement, Seattle; A. Scarsella, Seattle, low.

125 tons, 6-inch, Public Service Corp. of New Jersey, Newark, N. J.

Unstated tonnage, 260 lengths, 6-inch, Pawtucket, R. I.

Steel Pipe Placed

5000 tons, 27-inch, water supply system, Fort Smith, Ark.; Williams Bros., Tulsa, Okla., general contractor. Project also takes 310 tons of reinforcing bars and close to 2600 tons of cast iron pipe.

200 tons, 20-inch, Fort Mifflin; bids to United States engineer, Philadelphia.

Cold Finished

Cold Finished Prices, Page 63

Pittsburgh—Carbon cold-finished steel bars are firmly quoted at 1.95c, base, Pittsburgh. Specifications in June were a shade less than in May, but producers' backlogs are smaller as July commences. With some motor car makers scheduling initial production by August 15 on 1936 models, the cold-finished bar market may be enlivened from that source earlier than was expected by those who closely follow the cold drawn market.

•

SHEARED STEEL PLATES

Carbon and Alloy Grades

ANY QUALITY
ANY ANALYSIS

•

A. W. ROLLED STEEL FLOOR PLATES

•

ALAN WOOD STEEL CO.

CONSHOHOCKEN, PA.

ALAN WOOD STEEL CO. ESTABLISHED "A.W." TRADE MARK 1826 CONSHOHOCKEN, PA.

•

BRANCH OFFICES: *Boston, New York, Philadelphia, Memphis, Seattle, San Francisco, Los Angeles*

109 YEARS' STEEL MAKING EXPERIENCE

Shapes

Structural Shape Prices, Page 62

New York — McClintic-Marshall Corp., Bethlehem, Pa., is low on the Bronx approach to the Triboro bridge, 8950 tons of structural steel and several hundred tons of miscellaneous steel. Awards total several thousand tons in the New York eastern district. Fabricated steel prices show a wider range.

Pittsburgh—Appearance of plans for the department of interior building, Washington, has been delayed so that the original closing date on bids, July 16, likely will be extended. A reduction in height of the building may cut the steel tonnage to about 10,000 tons. Bids will be opened either July 19 or July 26 on 2885 tons of structural steel and 360 tons of piling by the Huntington, W. Va., engineers for the Winfield dam, West Virginia.

Cleveland—The Ohio highway department is taking bids on four bridges, one at Cambridge, Mansfield, Brinkhaven and Dover, requiring 2375 tons. Bids were opened late last week on 320 tons for a building for the Western Automatic Machine Screw Co., Elyria, O. Awards during the week were limited to small lots.

Chicago—Fabricators expect about 45,000 tons of shapes to be let in the near future, with an additional 50,000 tons in later prospect. New bids on 8700 tons of piling for the Ft. Peck, Mont., dam will not be taken since another form of construction is to be adopted, but about 6000 tons will be required for another unit of the Monroe, La., seawall. Bids will be taken between now and Aug. 3 on four Mississippi river locks involving about 7000 tons of plates, shapes and piling, in addition to forgings, castings and reinforcing bars. Inquiries for dams are to be issued later, taking an additional 18,000 tons.

Boston—Structural buying is light and fabricating shops have little plain material on hand as a rule. No large projects are pending.

Philadelphia — Apart from approximately 2600 tons of shapes for schools and postoffices in this district, little is pending. Shapes are steady at 1.90c, Bethlehem, or 2.015c, Philadelphia.

San Francisco—Awards in the week totaled 1775 tons, bringing the aggregate for the year to 46,292 tons, compared with 59,733 tons for the same period last year. Bids will be opened Aug. 20 for 6500 tons or more of transmission towers for the Los Angeles water district.

Seattle—While no awards of importance were released during the week, new projects are developing, the largest being for the superstructure of the Bonneville, Oreg. project powerhouse. Bids will be received by the United States engineer, Portland, Oreg., in July. The tonnage is unstated but this is the last large contract to be awarded at Bonneville. The same office has advertised for bids July 10 on about 2000 tons for lock and operating equipment at Bonneville.

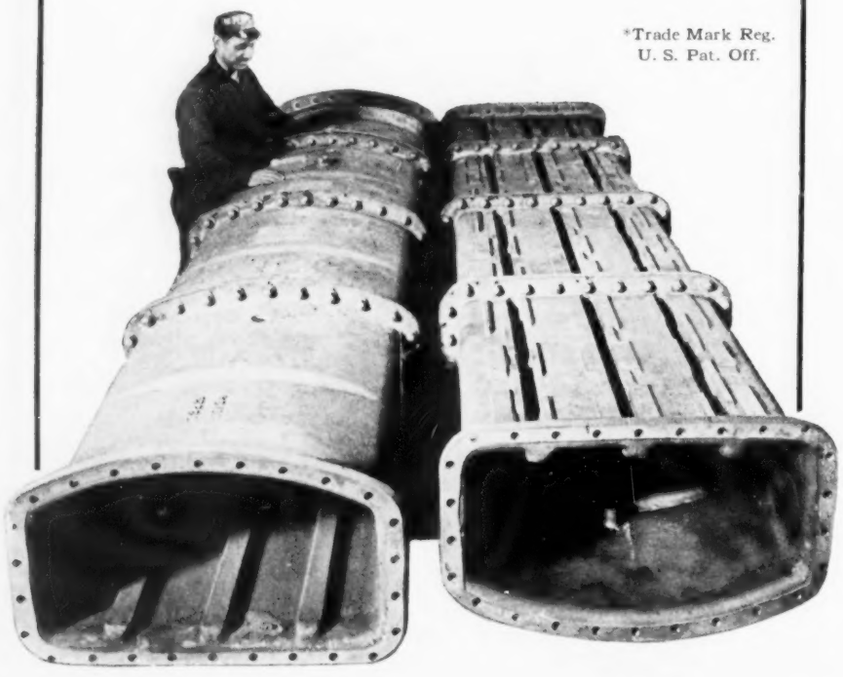
2½ Ton Muffle

Two and one half ton muffle . . . . . an ounce casting . . . . . all are alike to the Driver-Harris Foundry. The same precision and care is given to every casting. That is why "Chromax", "Cimet" and "Nichrome" are used in hundreds of plants, for these plants know that a quality casting brings quality results.

DRIVER-HARRIS COMPANY
Harrison, N. J.

# of CHROMAX*

*Trade Mark Reg. U. S. Pat. Off.



Shape Contracts Placed

8600 tons, Mississippi river bridge for St. Charles Bridge Co., subsidiary of

Shape Awards Compared

	Tons
Week ended June 29	21,342
Week ended June 22	32,891
Week ended June 15	6,255
This week, 1934	17,385
Weekly average, 1934	16,284
Weekly average, 1935	15,490
Weekly average, June	16,473
Total to date, 1934	463,717
Total to date, 1935	387,266

Wabash railroad at St. Charles, Mo., to American Bridge Co., Pittsburgh, and Mount Vernon Bridge Co., Mount Vernon, O., joint low bidders.

1250 tons, beam spans, Columbus, Nebr., to Worden-Allen Co., Milwaukee.

1200 tons, radial and track gates, Wheeler dam, Sheffield, Ala., for Tennessee valley authority, Knoxville, Tenn., to Lakeside Bridge & Steel Co., Milwaukee. Clyde Sales Co., Duluth, Minn., awarded power plant equipment at $162,565.

950 tons, school, Olean, N. Y., to McClintic-Marshall Corp., Bethlehem, Pa.; E. L. Van Sickel & Co., general contractor.

730 tons, cement plant, Grand Coulee dam, Washington, to Pittsburgh-Des Moines Steel Co., Des Moines, Iowa.

700 tons, bridge, Blodgett, Ill., to McClintic-Marshall Corp., Bethlehem, Pa.

600 tons, mold preparation building, Illinois Steel Co., Gary, Ind., to American Bridge Co., Pittsburgh.

595 tons, buildings, farm for poor, Woodville, Pa., to Fort Pitt Bridge Works, Pittsburgh.

565 tons, bridge NRH 183-A, Rogers county, Oklahoma, to J. B. Klein Iron & Foundry Co., Oklahoma City, Okla.

555 tons, Bayou St. John bridge 966-B, near New Orleans, to Jones & Laughlin Steel Corp., Pittsburgh.

540 tons, alterations to Rialto building, New York, to Bethlehem Fabricators Inc., Bethlehem, Pa.

500 tons, building, Liquid Carbonic Co., Chicago, to Joseph T. Ryerson & Son Inc., Chicago.

500 tons, Kress store, Orlanda, Fla., to Ingalls Iron Works Co., Birmingham, Ala.

390 tons, overhead span, Daviess county, Galena, Ill., to Duffin Iron Co., Chicago.

385 tons, dam gates, Savannah river bluff, Georgia, to Virginia Bridge & Iron Co., Roanoke, Va.

300 tons, building extension, Johns-Manville Co., Waukegan, Ill., to American Bridge Co., Pittsburgh.

300 tons, bridge, Comal county, Texas, to Pittsburgh-Des Moines Steel Co., Des Moines, Iowa.

275 tons, bar mill building extension, Republic Steel Corp., South Chicago, Ill., to Joseph T. Ryerson & Son Inc., Chicago.

250 tons, foundry for Magnus Co. Inc., Los Angeles, to Pacific Iron & Steel Co., Los Angeles.

225 tons, Bodine store, Miami, Fla., to Virginia Bridge & Iron Co., Roanoke, Va.

225 tons, boiler house, Johnsonburg, Pa., to F. M. Weaver, Lansdale, Pa.

220 tons, subway, Gurnee, Ill., state project, to Milwaukee Bridge Co., Milwaukee.

200 tons, canal bridge, Houma, La., to Vincennes Bridge Co., Vincennes, Ind.

190 tons, plant addition, Bundy Tubing Co., Detroit, to R. C. Mahon Co., Detroit.

175 tons, Kress store, Anniston, Ala., to Ingalls Iron Works Co., Birmingham, Ala.

160 tons, powerhouse, Monroe, Nebr., to Lincoln Steel Works, Lincoln, Nebr.

130 tons, bridge NRS 559, Jasper county, Missouri, to St. Joseph Structural Steel Co., St. Joseph, Mo.

125 tons, shapes and bars, building "Q" and tunnel, state school, Rome, N. Y., 65 tons of structurals to Utica Structural Steel Co., Utica, N. Y., and 60 tons of reinforcing to Concrete Steel Co., New York; A. E. Stevens Co., Springfield, Mass., general contractor.

107 tons, stadium, Bessemer, Ala., to Virginia Bridge & Iron Co., Roanoke, Va.

100 tons, California Fruit Wrapping Mills Inc., plant, Los Angeles, to Pacific Iron & Steel Co., Los Angeles.

100 tons, office and shop building, Wilshire Oil Co., Santa Fe Springs, Calif., to unnamed interest.

100 tons, girls' high school, San Francisco, to Schrader Iron Works, San Francisco.

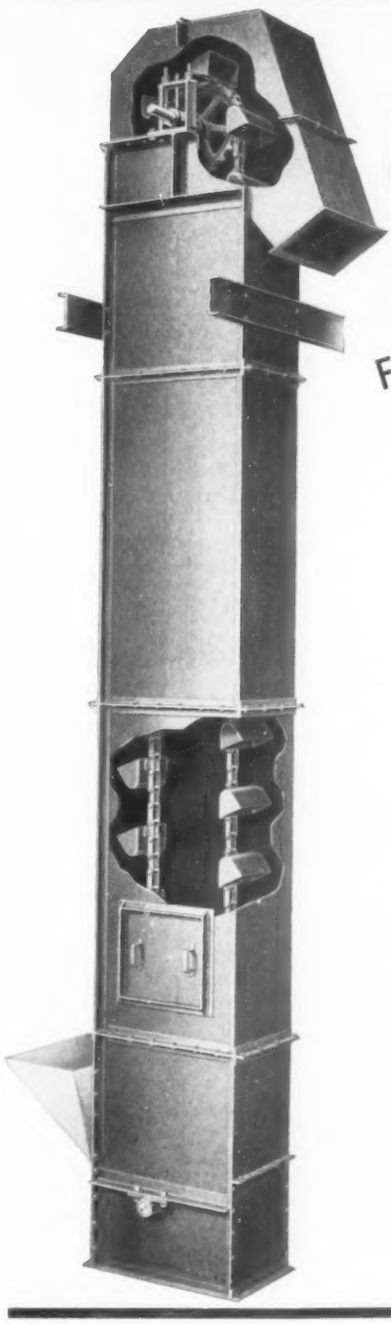
100 tons, discharge guides, specification 680-D, Boulder dam, Nev., to unnamed interest.

Shape Contracts Pending

10,000 tons, department of interior building, Washington; design changed from original estimate of 20,000 tons; bids originally set for July 16 expected to be postponed.

8959 tons, 3800 tons silicon, 5150 carbon, Bronx approach, Triboro bridge, New York, McClintic-Marshall Corp., Bethlehem, Pa., low, $1,093,753; Taylor-Fichter Steel Construction Co. Inc., New York, $1,163,680; Harris Struc-

LINK-BELT



Bucket Elevators
FOR ALL MATERIALS

THE Link-Belt line of cost-reducing elevating and conveying equipment is complete, and includes all such elements as chains, sprockets, buckets, power transmission units, belt conveyor idlers, flight conveyors, bucket carriers, feeders, screw conveyor, etc.

We offer our products, our extensive facilities, and our wide experience, through the nearest office. Extensive stocks of standard Link-Belt parts are carried at convenient points throughout the country.

LINK-BELT COMPANY

The Leading Manufacturer of Equipment for Handling Materials and Transmitting Power

INDIANAPOLIS - CHICAGO - PHILADELPHIA
SAN FRANCISCO - TORONTO - ATLANTA
Offices in Principal Cities

4930-C

tural Steel Co., New York, $1,172,770; Phoenix Bridge Co., Phoenixville, Pa., $1,176,100; American Bridge Co., Pittsburgh, $1,185,241,60.

6500 tons, transmission towers, metropolitan water district, Los Angeles; bids Aug. 20.

6000 tons, piling, seawall, Monroe, La.

3300 tons, structural steel, piling and reinforcing steel, construction of lock No. 13, Mississippi river above Clinton, Iowa; bids to Rock Island, Ill., engineers, July 16. Specifications include five tons of corrosion-resisting steel.

2375 tons, state bridges, Cambridge, Mansfield, Brinkhaven, Dover, O.

2350 tons, including 1400 tons of piling; also 95 tons of forgings and 68 tons of castings, lock No. 17, Mississippi river, New Boston, Ill.; bids to United States engineer, Rock Island, Ill., July 29.

2000 tons, lock and operating equipment, Bonneville, Oreg. dam; bids to United States engineer, Portland, July 10.

1750 tons, work house and stock cellars, for Stroh Brewing Co., Detroit.

1700 tons, addition to Acacia Life Insurance building, Washington; Turner Construction Co., general contractor.

1600 tons, plant addition, Briggs Mfg. Co., Detroit.

1220 tons, including 600 tons of piling, also 60 tons of forgings and 60 tons of castings, lock No. 14, Mississippi river, Le Claire, Iowa; bids to United States engineer, Rock Island, Ill., Aug. 3.

1250 tons, county jail, Bronx, New York, George F. Driscoll Co., Brooklyn, N. Y., low, $753,500.

1000 tons, mint, San Francisco; bids July 25.

1000 tons, estimated, postoffice, Wilmington, Del.; 125 to 150 tons of reinforcing bars also required.

800 tons, postoffice, Atlantic City, N. J., bids July 26; 100 tons of reinforcing bars also required.

750 tons, grade crossings, Port Richmond-Tower Hill, Staten Island Rapid Transit railroad, Staten Island, N. Y.; bids to chief engineer, Baltimore, July 5.

600 tons, girder spans, Ft. Dodge, Iowa; Wisconsin Bridge & Iron Co., Milwaukee, low for general contract.

400 tons, high school, Reading, Pa., bids July 17; approximately 100 tons of bars and joists also required.

400 tons, postoffice, Chester, Pa., George A. Fuller Co., Philadelphia, expected to be awarded general contract; 125 tons of bars will also be required.

350 tons, building for Viscose Co., Meadville, Pa.

300 tons, Emery Industries Inc., store building, Cincinnati; Messner & Sons Co., Cincinnati, general contractors.

270 tons, building, for Hall China Co., East Liverpool, O.

200 tons, Kentucky state highway project in Elliott county; bids at Frankfort, July 8.

150 tons, Penn theater, Washington.

125 tons, distributing station, light and power bureau, Los Angeles; bids soon.

100 tons, structurals and reinforcing bars, diversion of Henderson river one-half mile below lock and dam No. 18, Burlington, Iowa; bids to army engineers, Rock Island, Ill., July 19.

100 tons, state bridge, Connecticut; bids July 8.

Behind the Scenes with STEEL

Nut Bolts

The morning's mail from Columbia, S. C., brings us a cryptic 2-page epistle of typewritten advice, part of which we reproduce as follows:

"Persons who have brown eyes generally have extraordinary ability with both head and hands. They wish to treat everybody right with whom they associate—4.

"Ohio State university is a good college—4 (H. Snow.) (A. Ogg—4.)

"STEEL magazine is a valuable magazine.

"A. Ogg—4, A.M., A.B., Ph. D.

"Stanley Ogg—4 lives at Mansfield, O., or Hamilton, O., or Columbus, O.

"Ogg—4 is scotch descent.

"We wear Mansfield—4 Union-suits—4. They are good union-suits.

"All education is truth.

"No president—4 can please everybody—4. Yours truly.

Our first impulse was to inform the warden at the South Carolina state institution that one of his charges had apparently bolted. Then, we considered the possibilities of a hidden code message of some dire international significance. Then, we started beating our head against the desk, rhythmically.

At least, Ogg—4 A.M. toot-toot, STEEL—4 Og-og is the fastest—4 wunff growing industrial publication—4 hey-hey in the country—4 Ogg, Yours truly.

* * *

Abou Ben Adhem

When Federal Co-ordinator of Transportation Eastman in Washington recently sent out requests for bids on business papers, STEEL, although not in alphabetical order, headed the list. Does STEEL head your list of MUST industrial magazines?

* * *

Beautiful and Busy

If a contest is ever held for attractive industrial plants, we'll cast a vote for the Milford Rivet & Machine Co., Milford, Conn.

We were passing through there recently via the old Boston Post road and actually craned our weary neck to see this beauty among the beasts. It is well situated back from the highway and is of red brick with white wood trim, in the typical New England style. A gravel driveway swings in to the front entrance and the lawn is landscaped with flowers, shrubs and other trimmings. At night the whole affair is floodlighted, giving the impression of a public memorial building rather than a manufacturing plant.

We're not sure whether the attractiveness of the place has anything to do with it or not, but when we passed, the night shift was apparently going full blast.

Have you a candidate for the Adonis of industrial plants?

* * *

Y'r ob'd't S'v't, etc.

Among other things, the French have a flair for rising to great heights in the "complimentary close" of their business letters. Witness this from a Paris office:

"Avec nos remerciements anticipes, nous vous prions d'agreer, Monsieur et Cher Confrere, l'assurance de nos sentiments les plus distingues. . . ."

Which, if our broken down French is still with us, translates literally into:

"With our anticipated thanks, we beg you to agree, Sir and dear coworker, to the assurance of our sentiments the most distinguished.. . ."

Wary of these grandiose gestures from the Old World, we'll stick to our horse.

* * *

Economy

The depression has forced stringent economy to be the rule, not the exception. This has been absolutely necessary in many cases, but every once in a while you hear of some strange twists to depression economy.

One of our good subscribers over East formerly had two subscriptions, one for the metropolitan office and one for the New England plant. So they decided to economize and canceled the factory subscription, writing us to that effect. Well, that was all right.

But one of our circulation sleuths has uncovered the fact that they are reading STEEL at the office each week and then *mailing* it on up to the plant. To so mail STEEL costs them more than the weekly price of a two-year subscription which is 5.7 cents per copy. In other words they could have kept the two subscriptions and saved 0.3 cent per week over the present setup, with the added advantage of both office and plant having copies while they're fresh.

What is that old story about cutting off one's nose, etc.?

—SHRDLU

Reinforcing

Reinforcing Bar Prices, Page 63

Pittsburgh—In voting to discard the blanket-bid policy on the Liberty tubes plaza last week, the Allegheny county authority, Pittsburgh, decided to divide the work on this $1,721,000 project into six separate contracts. It requires about 1000 tons of new billet steel bars. Bids are expected to be asked for shortly on the six separate projects.

Cleveland—General contract bids on substantial tonnages in the Muskingum, Ohio, conservancy district were opened last week, and material purchases are expected shortly. The state is taking bids on

Concrete Awards Compared

	Tons
Week ended June 29	6360
Week ended June 22	1,990
Week ended June 15	2,634
This week in 1934	2,025
Weekly average, 1934	4,084
Weekly average, 1935	5016
Weekly average, June	3931
Total to date, 1934	129,031
Total to date, 1935	125,414

600 tons for work in the northern conservation district.

Chicago—Inquiries have been received for four Mississippi river locks, involving 2640 tons of bars, on which bids will be taken between now and Aug. 3. Inquiries for dams, to be issued later, will involve about 2700 tons. Awards include 1000 tons for the Detroit parcel post building and a similar tonnage for a Kansas City, Mo., school.

Boston—In small lots, reinforcing steel buying is light. Few inquiries are for more than 100 tons.

Philadelphia—Approximately 475 tons of reinforcing bars are pending for three postoffices and one school in this district. Little else is active. Billet steel bars, cut lengths, continue 2.36c, delivered, Philadelphia.

San Francisco—The market is active, over 1000 tons being awarded. The outstanding item was 285 tons for the Folger avenue crossing, Berkeley, Calif., placed with Soule Steel Co.

Seattle—Lack of demand for reinforcing bars in state highway work and in general construction is curtailing volume.

Reinforcing Steel Awards

1780 tons, grade separations, Port Richmond-Tower Hill, Staten Island Rapid Transit railroad, Staten Island, N. Y.; divided 1000 tons to Truscon Steel Co., Youngstown, O., 780 tons to Joseph T. Ryerson & Son Co. Inc., Chicago; through P. T. Cox Contracting Co.

1000 tons, parcel post building, Detroit, to Concrete Engineering Co., Chicago.

1000 tons, school, Kansas City, Mo., to Concrete Engineering Co., Chicago.

500 tons, including piling, substructure, Henry Hudson bridge, Spuyten Duyvil, N. Y., to Joseph T. Ryerson & Son Co. Inc., New York.

285 tons, Folger avenue crossing, Berkeley, Calif., to Soule Steel Co., San Francisco.

250 tons, addition to high school, Van Nuys, Calif., to unnamed interest.

235 tons, piers, Bronx and Bronx Kills spurs, Triboro bridge, New York, to Truscon Steel Co., Youngstown, O., Tully & Di Napoli Inc., Long Island City, general contractors, at $395,525.

100 tons, Westchester county home, East View, N. Y., to Carroll & McCready Co. Inc., Brooklyn, N. Y.; through William Crow Construction Co.

110 tons, Erie county, New York, relief administration, to Beals, McCarthy & Rogers, Buffalo.

100 tons, disposal plant, Verona, N. J., to Joseph T. Ryerson & Son Co. Inc., New York.

Reinforcing Steel Pending

700 tons, mint, San Francisco; bids July 25.

640 tons, lock No. 17, New Boston, Ill.; bids to United States engineer, Rock Island, Ill., July 29.

600 tons, lock No. 14, Le Clair, Iowa; bids to United States engineer, Rock Island, Ill., Aug. 3.

275 tons, women's dormitory, University of Washington, Seattle; general contract to Sheble Construction Co., Seattle.

125 tons, school, Quincy, Mass.; taking bids.

125 tons, postoffice, Chester, Pa., general contract expected to be awarded to George A. Fuller Co., Philadelphia; also 400 tons of shapes.

125 to 150 tons, estimated, postoffice, Wilmington, Del., bids to be opened in latter part of July; also approximately 1000 tons of shapes.

100 tons, postoffice, Atlantic City, bids July 26; also 800 tons of shapes.

100 tons, bars and joists, high school, Reading, Pa., bids July 17; also 400 tons of shapes.

100 tons, distributing station, power and light bureau, Los Angeles; bids soon.

Unstated tonnage, piers to Jerome street bridge, McKeesport, Pa.; Freeland Inc., Pittsburgh, low at $148,761.50.

Strip Steel

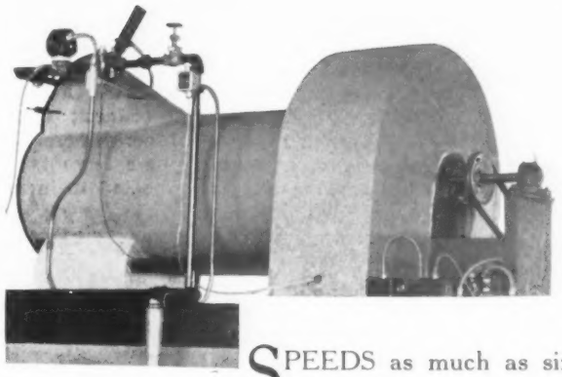
Strip Prices, Page 63

New York—Narrow strip is still moving slowly, with automobile accessory manufacturers specifying less freely than at any time this year. Prices are unchanged.

Pittsburgh—Strip steel prices continue steady. Automotive buying of

SIX TIMES FASTER

than older heat-treating methods



Gas fired, Morrison heating unit. Note that all heat and atmosphere controls are in one place, easily adjusted and highly accurate.

SPEEDS as much as six times faster than older methods in bringing the charge up to full, uniform heat are commonly encountered by users of Morrison forced convection heating equipment. Through recirculation of heated air, correct engineering design, and adequate insulation, approximately 86% of the available heat is transferred directly into the work. These advantages, both in production time and thermal efficiency, will return to you tangible savings—savings that mean most where profits are otherwise small. Your letter will bring you complete details.

ADDITIONAL MORRISON ENGINEERED EQUIPMENT

Convection heating equipment for paint, foundry, ceramic, and lithographing ovens. Tank and process heating up to 1400° F.

THE MORRISON ENGINEERING CO., INC.

5005 EUCLID AVENUE - - - CLEVELAND, OHIO

strip for wheel rims, frames, hardware, and miscellaneous parts has dwindled, but specifications are expected within the next few weeks on initial parts for the first of the 1936 models.

Cleveland—Chrysler placed some substantial orders for spring and fender stock, but otherwise the market was quiet.

Chicago—Strip demand is off slightly but the recession is no greater than had been anticipated. Automotive needs reflect the seasonal letdown in that industry, and demand from miscellaneous consumers also is less active than a month ago.

Boston—Cold-rolled strip demand is largely in small lots for specialty production, automotive parts, needs having declined. Buying is spotty and not in large volume. Prices are steady with little interest shown by buyers for third quarter. Hot-rolled is less active than cold-finished.

Bolts, Nuts, Rivets

Bolt, Nut, Rivet Prices, Page 63

Third quarter contracting for bolts, nuts and rivets is practically complete, with prices reported slightly firmer on bolts and nuts. The market for the latter nominally is 70-10-5 off list, with large rivets 2.90c, Cleveland and Pittsburgh, 3.00c, Chicago, and small rivets 70 and 5 off. Demand is moderately quieter following some improvement early in June. Larger orders are in prospect from some railroads which are more active in car repair work.

Wire

Wire Prices, Page 63

Pittsburgh — Manufacturing wire is most stable, while nails, fence, and fence-wire demand is slower. Plain manufacturers' wire, 6-9 gage, remains 2.30c, base, Pittsburgh, and nails, $2.60 per keg. Spring wire is quoted 2.90c, annealed fence wire, 2.45c, and galvanized fence wire, 2.80c, Pittsburgh or Cleveland.

Cleveland — Some manufacturers still are several weeks behind in deliveries of farm fencing. Orders for manufacturers' wire are lighter.

Chicago — Slackening in demand for manufacturers' wire has been only moderate, with orders from a diversified range of consumers. Automotive requirements have tapered further, but are expected to increase by August in anticipation of new model production. Prices continue steady at previous levels.

Boston—Decline in wire buying has been slight, although there has been some gradual falling off in most departments, including specialties, spring, manufacturers' wire and rope. There is some routine covering for third quarter.

Philadelphia — Agricultural requirements continue to lead in the wire market. These requirements are said to be much better than a year ago. Prices generally are steady.

Pig Iron

Pig Iron Prices, Page 64

Pittsburgh—Merchant pig iron purchases are still confined to light requirements. Much of the current merchant iron melt is continuing to go into ingot molds. One foundry here paid $14.50 for No. 1 cupola cast scrap the past week and $12.50 for stripped motor blocks.

Chicago—June shipments were about 10 per cent below May. While production of automotive castings will continue at a reduced level during July, farm implement manufacturers and miscellaneous foundries are expected to hold the melt at a fairly steady rate.

Boston—Heavier sales, still mostly in small lots, brought the total movement of iron to more than 1000 tons during the last 10 days. Domestic iron moved at unchanged prices, but foreign iron was stimulated by price inducements in some instances. This flurry, however, has not been accomplished by any increase in foundry melt.

New York—Shipments in this district for June likely will be about on a parity with the May movement. Prices on domestic iron, while unchanged, are subject to increasing pressure from foreign competition.

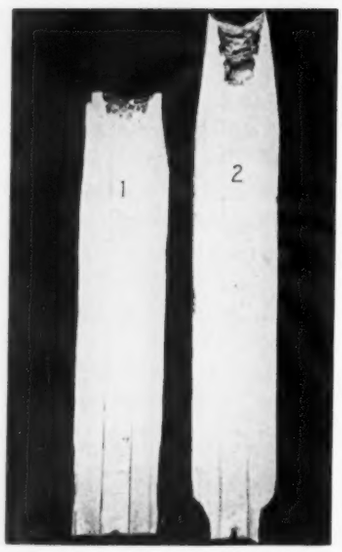
Philadelphia—Shipments for June were slightly ahead of those for May. Recent importations here included 1000 tons of English low phosphorus pig iron for a western Pennsylvania consumer.

Buffalo—Republic Steel Corp. has relighted a second blast furnace, following installation of a new blower representing an investment of over $150,000. This restores district operations to six, the highest number for the past three years.

Cleveland—The market is quieter, with only small, spot orders being placed. June shipments were 10 per cent below those of May.

Cincinnati—Third quarter tonnages are going on books of district

Let LIQUITOL Reduce YOUR INGOT COSTS



(1) Is treated with LIQUITOL A SPECIAL, the fluid metal is only poured to half of the head. The formation of the hole is such that the ingot is quite solid. The savings in 16 of these ingots is 1 ingot. This is only used for refined steel, that is to say, tool steel, cutting steel, and special steels of high quality.

***Liquitol* is a scientifically prepared product resulting in sound Steel or Iron Castings. It retards cooling of hot top metal. Cavities and porosities practically eliminated.**

Does not injure or affect physical or analytical properties of steel or cast iron.

Made in 4 grades for 4 purposes.

Ask for detailed bulletin AL-16-A.

THE ALPHA-LUX COMPANY, INC.

192 Front St.,
NEW YORK CITY

Branches

Philadelphia Chicago

furnace representatives, none reported over 500 tons.

St. Louis—Preliminary reports indicate June shipments will exceed slightly the May total. Shipments during the first half of this year are the largest for any six months since 1930. While new buying continues mainly in small lots for prompt shipment, there has been a good volume of inquiry third quarter, as well as a fair volume of actual business placed.

Birmingham, Ala.—Seasonal slowing in pig iron likely will be obviated if anticipated demand is forthcoming.

Seattle—No price change for this area has been announced for third quarter. Columbia iron is priced at $17.50 base No. 1, $19 f.o.b. Provo, Utah. Sales are slow and in small tonnages.

Toronto, Ont.—Merchant pig iron sales continue at a higher level. The daily melt is holding around 45 per cent. Pig iron production in May totaled 45,432 long tons, an increase of 5 per cent over April rate.

Scrap

Scrap Prices, Page 65

Pittsburgh—Return to the buying market by two important down-river scrap consumers has provided basis for a distinctly firmer undertone. Buying brokers for these points are paying $12 for No. 1 steel, $11 for No. 2 steel, and $8 for machine shop turnings. No. 1 cupola cast is 50 cents stronger at $13.50 to $14. Carnegie Steel Co. has sold 3000 tons of nickel armor plate scrap to the United Iron & Metal Co. in collaboration with Max Meltzer Co., the latter both of Pittsburgh. It is reported that this material will be exported. The material is in charging-box size and located at West Homestead, Pa., and Munhall, Pa. Its analysis runs from 3.25 to 3.75 per cent nickel with a maximum chrome content of 1.60.

Cleveland—Scrap shipments continue in a desultory way. Some local dealers are interested in reported recent purchase of various grades by an important Youngstown district steelmaker at around $12 for No. 1 and $11.25 for No. 2, with some busheling and pressed sheets. Quotations are being stiffly held, with material difficult to obtain.

Chicago — Scrap is quiet as to consumer buying, but prices are steady and generally unchanged. Heavy melting steel nominally is unchanged at $9.75 to $10.25, with this grade on recent railroad lists still commanding around $10.50. Sellers are unable to cover old orders at much below $10. Shipments are steady. Some scrap is being laid down at local docks for eastern shipment.

Minneapolis & St. Louis has been given permission to abandon 22 miles of line between Martinsburg and Junction Switch, Iowa, from which rails and scrap material worth $70,000 will be recovered.

Boston—Continued brisk buying for export has steadied scrap prices with heavy melting steel decidedly firm for boat loading. Other grades for delivery at docks are above quotations for domestic shipments, which are light.

New York—While scrap prices are unchanged, except turnings, which are off 25 cents per ton, the general tone is unsettled. Buying for export continues with no letdown, the recent advance on No. 2 heavy melting steel to $7.50, dock, holding on large tonnages. Domestic shipments are small.

Philadelphia—Scrap prices generally are holding. Heavy breakable cast is higher on an $11 sale to an eastern Pennsylvania consumer and prices on No. 1 steel are easier, but all other prices are unchanged, including the wharf prices on steel for export. Domestic demand continues light, except for one or two fair-sized inquiries. Export of scrap from this port is expected to be heavier this month than last, and, some think, may possibly approach the movement in May, estimated at around 35,000 tons. Much, it is said, will depend upon availability of boats. Three boats, one small and two large, are scheduled to start loading there this week.

Buffalo—Nominal prices again prevail in the local scrap market. Consumers claim to be well supplied and dealers will not sacrifice material to obtain contracts.

Detroit — Scrap iron and steel prices remain unchanged, but there is a firmer undertone and an increasing optimism for the long pull. Dealers feel certain that prices will go no lower and some look forward to the possibility of an active market in the fall.

Cincinnati — Quotations on iron and steel scrap are unchanged in a dull market. Mills, with operations tending lower, have adequate stocks. Trading in odd lots, both for dealer and consumer accounts, is dull.

St. Louis — A few carloads of special, miscellaneous material constituted the total of iron and steel scrap transactions in this area recently. Mills are taking no interest.

Seattle—With dispatch of 8500 tons of steel scrap and rails, expert commitments in this area are prac-

CROSBY STAMPINGS

Since 1896 the Crosby plant has been devoted, exclusively, to designing and producing Sheet Metal Stampings. Avail yourself of this experience. Send us your next stamping problem and watch results.

Manufacturers IDEAL TROLLEY WHEELS

THE CROSBY COMPANY
BUFFALO, N. Y.

Branch Offices

New York, Philadelphia, Cleveland, Detroit, Chicago.

tically covered. Prices are off about 10 per cent.

Birmingham, Ala. — Continued dullness prevails in iron and steel scrap, with no prospects of immediate improvement.

Toronto, Ont.—Trading in iron and steel scrap is steadily improving, due to larger purchases by mills in the Hamilton district. Foundries are taking larger tonnages of iron scrap. No forward delivery contracts are reported. No. 1 machinery cast and wrought scrap are the most active grades.

Warehouse

Warehouse Prices, Page 66

Pittsburgh—Mill supply houses have advanced prices on bars, plates, and structurals to 2.80c on bars and 3.05c on plates and structurals. Cold-drawn bars remain 3.20c. June sales by local warehouses were about 10 per cent less in volume than those of May.

Chicago—June business showed little change from the May volume. Prices are holding well.

New York — Warehouse sales in June fell slightly under May in most cases. Orders are fairly numerous, but weights per order are inclined to be light with buying well spread.

Philadelphia — Leading jobbers here report business in June about 15 per cent below the May volume and most jobbers look for little real improvement much before September. Prices are unchanged.

Detroit—Warehouse business in iron and steel is holding to the average of middle June. Indications are that early introduction of new automobile models will enable warehouses to bridge the summer on a comparatively level basis. Prices are unchanged.

Cincinnati — Demand for steel from warehouse took a modest upward turn during the past week, on industrial buying, so that total tonnage for June was close to May deliveries.

St. Louis—Some iron and steel warehouses report a slight recession in volume of business during the first three weeks of June as contrasted with the comparable period a month earlier.

San Francisco—Movement of warehouse material has increased. Prices on the Pacific coast on cold finished steel have been advanced 15 cents.

Seattle—Inactivity in logging and lumber continues to restrict warehouse volume and business generally is slow for this reason.

Tin Plate

Tin Plate Prices, Page 62

Pittsburgh — Details will be announced shortly on an important can contract with a leading brewery for marketing beer in tin containers. This outlet is expected to develop into a heavy tonnage item for the tin plate industry, as beermakers are calculated to use more than 9,000,000,000 cans yearly. Some tin plate producers' warehouse stocks are moving slightly better, but others report a disappointing rate of shipments. Production averages 65 per cent, and this week there will be extensive mill shutdowns.

Steel in Europe

Foreign Steel Prices, Page 66

London — (*By Cable*) — Middlesbrough blast furnaces are booking orders for third quarter and hematite stocks in Great Britain are diminishing, with some sales for export. Dorman, Long & Co. Ltd., Middlesbrough, are reported to plan erection of another blast furnace stack. Midland steelworks are operating actively. Foundry pig iron is moving well. Galvanized sheets show improvement, with Australia buying. Outlook for tin plate is good.

The Continent reports export trade dull, and Belgian production is slowing. Paris sees some improvement in the domestic market for sheets. Berlin reports sales of merchant bars to South America and China.

Metallurgical Coke

Coke Prices, Page 63

Practically all users of standard furnace and beehive foundry coke have dropped out of the market, and prices are purely nominal. Buyers believe they could purchase standard furnace coke at $3.40 a ton, Connellsville, Pa., oven basis, if they were obliged to enter the market, but the foundry coke market at $4.60 per ton is comparatively firm, and a same degree of strength characterizes premium foundry coke at $5.10 to $5.35.

Foundry coke shipments in the Chicago district exceed those of the same period a year ago and prices for July are continued unchanged. Demand and prices are unchanged at Cincinnati and in the St. Louis area the summer decline is less than expected.

Semifinished

Semifinished Prices, Page 63

Sheet bar, tin bar and billet orders are tending lower. Prices are steady, and on a Pittsburgh base sheet bars remain $28; rerolling billets, $27; forging quality billets, $32; and common wire rods, $38.

Ferroalloys

Ferroalloy Prices, Page 64

New York — The light buying in recent weeks and stability of prices are regarded as the principal reasons

for the comparatively stable outlook in ferromanganese. Prices are unchanged.

Nonferrous Metals

Nonferrous Metal Prices, Page 64

New York—Copper broke 1 cent a pound last week to furnish the outstanding development in the nonferrous metal market. Other metals held steady despite the drop in copper.

Copper—The market was returned to an open-market basis, resulting in the first price change since June, 1934. Electrolytic metal sold at 8.00c, Connecticut, while lake copper dropped to the corresponding differential of 8.12½c, Midwest. Copper was going abroad at 7.20c as the week closed. Casting copper here dropped to 7.25c. This grade, of course, had not been under price control during the operation of the copper code. Copper wire prices dropped from ¾-cent to 1 cent a pound, while copper and brass rolled products fell from ⅝-cent to 1 cent.

Lead—Sellers opened books for August at the close of last week and some buying was done for that period. Consumers still are not covered on about 50 per cent of their July needs. One seller continued to do business at $2 a ton over the going market.

Zinc—Business was in comparatively light volume but sellers found little difficulty in maintaining the 4.30-cent level. Renewed labor trouble developed in the Tri-State area late in the week.

Tin—Spot supplies continued extremely tight and prices worked upward slightly. Domestic deliveries in June totaled 4615 tons compared with 3950 tons in May and 3845 tons a year ago. Increased production quotas go into effect today but these are not sufficient to supply demand.

Aluminum—Secondary ingot held unchanged although scrap is a shade easier. Virgin grades were steady.

Coke By-Products

Coke By-Product Prices, Page 63

New York — Distillate prices are firm, with demand sufficient to absorb current output. Other coke oven by-products are seasonally slow.

Quicksilver

New York — Quicksilver prices are unchanged with lots of 15 to 24 virgin flasks, inclusive, $72.50. Large lots of 100 flasks and more are available down to $71.

Mirrors of Motordom

(*Continued from Page* 19)

ployment of upward of 60,000 persons.

AT THE turn of the half year the automobile industry can point to a contribution to recovery not equaled by any other major industry.

Notwithstanding the fact that final statistics on May production — 364,721 units — showed a disappointing shrinkage from weekly estimates, necessitating a revision of June to about 340,000 units, the first half year's total was approximately 2,240,000 cars and trucks in the United States.

This is a total apparently exceeded only in the first halves of 1929 and 1926. It seemingly slightly exceeded output in the first half of 1930, the last half of 1929 and both halves of 1928, although the comparison is so close a hundred thousand cars either way would revise the picture.

Entering July, the prospect is for a further recession, although the 264,939 total for last July should be slightly bettered. August seems destined to be the bottom of the present seasonal slide, particularly if Ford goes down for two weeks, as now seems probable, and some other makers begin their changeover to new models.

For steel, late July and early August probably will be the low point, with shipments to Detroit improved in the last half of August in anticipation of a start in September on production of many new models on a volume basis.

A beginning is being made on placement of parts business for 1936 models. Prices have been submitted on bars, strip and alloy steel for several important consumers in the past ten days; it is stated that the equivalent of code prices has been quoted in every case.

For all practical purposes, no pressure is being exerted against steel prices, but large consumers continue of the opinion that the volume of their business warrants differentials for quantity, and in some quarters it is believed that an announcement maintaining present base prices but granting differentials for quantity will be made prior to a determination by automobile manufacturers of costs on their 1936 models. Incidentally, no radical changes in automobile prices appear in prospect.

Generally, sentiment in the auto-

THIS STAMPING halved THE COST

Even steel castings made by best foundry practise developed up to this time constantly failed under the high pressures and abuse this pressure fitting had to withstand.

Parish designing service produced the answer—a leak proof composite fitting of stamped-and-welded design that tested at 100 pounds air pressure and saved half the weight and half the cost. Naturally, it is now the standard.

Why not send us YOUR blue prints AND SPECIFICATIONS?

PARISH PRESSED STEEL Co.

(Specialists in difficult stamping design)
Robeson & Weiser Sts.,
READING, PENNSYLVANIA

Pacific Coast Rep.: F. Somers Peterson Co., 57 California St., San Francisco, Cal.

mobile industry continues strong. There is the feeling that the used car situation is more in hand, and one authority estimates dealer stocks of new cars at about 300,000 units, of used cars at 375,000 units, and trucks at 60,000.

Much has been heard concerning diesel power for passenger automobiles recently. The cross-continent run sponsored by the Cummins Engine Co., Columbus, Ind., is an experiment with a diesel-powered Auburn stock car. While the venture is that of the Cummins company, nevertheless Auburn is sympathetic.

A stir was created in the East last week by the report that a Ford mounting a 4-cylinder diesel engine was undergoing secret tests in the vicinity of the Edgewater, N. J., assembly plant of the Ford company; this car was reported to be destined for competition with a low-price Japanese model. It is undoubtedly true that Ford is experimenting with diesels as with innumerable other potentialities.

It should not be forgotten that General Motors through its Winton division in Cleveland has probably had greater experience with diesels than any other large-scale automobile manufacturer. Packard appears to have done little in this direction since the accident to its Woolson experiment with a diesel-powered airplane several years ago. Truck diesels are now units in many fleets.

Nor should it be overlooked that up at Lansing, Reo is understood to be well along with a 4-cylinder diesel job capable of doing 100 to 150 miles on one gallon of oil, with a top speed of 60 miles an hour.

Personals

(*Concluded from Page* 23)

dling sales of refractories, nonslip floors and boron carbide.

R. M. Johnson will continue as sales engineer but will include in his duties direction of sales engineering work on all abrasive products.

C. W. Jinnette, for many years Norton district manager in Michigan, becomes regional manager, sales planning and development, working in the Middle West.

P. H. Clapp will transfer from the Pacific coast to Detroit, succeeding Mr. Jinnette.

P. S. Wiswell, recently divisional manager for Behr-Manning Corp. in Chicago, has been transferred to the Pacific coast where he will supervise sales activities and personnel of Norton Co. and Behr-Manning.

• • •

W. L. Batt, president, SKF Industries Inc., Philadelphia, has been nominated for president of the American Society of Mechanical Engineers for 1936, nomination virtually assuring election, which is by letter ballot to members, closing Sept. 24.

Other nominations include: Four vice presidents—A. D. Bailey, superintendent generating stations, Commonwealth Edison Co., Chicago; J. A. Hunter, professor, University of Colorado, Boulder, Colo.; R. L. Sackett, dean, Pennsylvania State College, State College, Pa.; and W. A. Shoudy, Orrok, Myers & Shoudy, consulting engineers, New York; and three managers — W. L. Dudley, vice president, Western Blower Co., Seattle; W. C. Lindemann, secretary, A. J. Lindemann & Hoverson Co., Milwaukee; and J. W. Parker, chief engineer, Detroit Edison Co., Detroit.

• • •

W. M. McConnell has been appointed to the engineering department of the Patterson Foundry & Machine Co., East Liverpool, O., to take charge of the drafting room. He has been associated previously with the Koppers Co. and American Cyanamid & Chemical Corp., in the handling of process equipment and plant design.

Labor

PRESIDENT Roosevelt Monday (July 1) was to sign the Wagner labor disputes bill following approval of a conference report by both houses of congress Friday. This marks enactment of another "must" bill behind which is organized labor.

In conference, the provision limiting representation to one plant was eliminated. As finally approved, the bill sets up an independent national labor relations board of three members, re-states the collective bargaining clause of NRA, calls for elections and majority rule, and by prohibiting coercion or any contribution by employers is supposed to outlaw employe representation plans.

Industry's opposition to the bill, implacable at first, softened somewhat after the NRA decision for the reason the Supreme Court's objections to NRA are believed also to apply to the Wagner bill. A suit contesting its constitutionality is expected to result from the first collision between labor and industry.

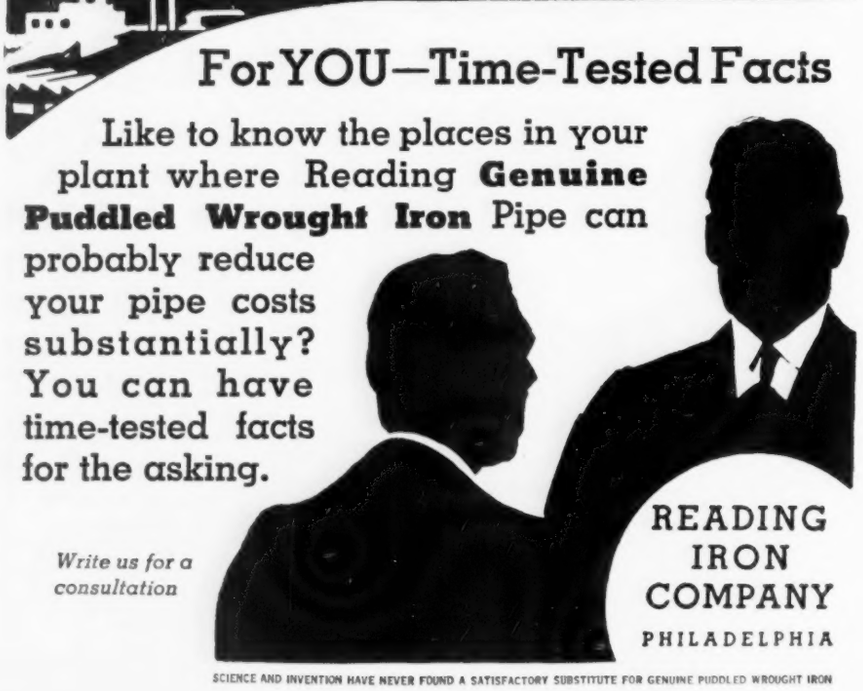
STEEL PAYROLLS UP IN MAY

May payrolls of the steel industry were more than $600,000 greater than those of April, despite a decline of nearly four points in operations, according to the American Iron and Steel institute, New York. Comparisons of May with April of this year and last May follow:

	May, 1935	April, 1935
Total number, all employes	421,470	424,623
Total payrolls, all employes	$46,493,536	$45,890,244
Hours per week per wage earner	33.9	33.7
Av. earnings per hour, wage earners	65.5	65.9
Operating rate	43.53%	45.28%

FINDS APPRENTICES NEEDED

A survey just completed by the National Industrial Conference board, New York, finds that a comprehensive and efficient system of apprenticeship training is necessary


For YOU—Time-Tested Facts
Like to know the places in your plant where Reading Genuine Puddled Wrought Iron Pipe can probably reduce your pipe costs substantially? You can have time-tested facts for the asking.
Write us for a consultation
READING IRON COMPANY
PHILADELPHIA
SCIENCE AND INVENTION HAVE NEVER FOUND A SATISFACTORY SUBSTITUTE FOR GENUINE PUDDLED WROUGHT IRON

to meeting the lack of skilled labor now facing industry. In the survey 287 metal manufacturing companies in 21 states reported the total number of craftsmen needed now, but not available, is 1193, indicating, with industries operating at normal capacity, a shortage of about 120,000 skilled workers. Co-operation between companies, with trade associations or the state, and with training schools and vocational courses, is urged.

BAR IRON WAGES STEADY

Wage rates in bar iron mills having contracts with the Amalgamated Association of Iron, Steel and Tin Workers will remain unchanged for July and August. The bimonthly settlement last week showed no price change in May and June. Boiling, bar and 12-inch mills remain on a 2.00c basis, and the guide and 10-inch mills on a 2.10c card.

ALGOMA RAISES WAGES

Algoma Steel Corp., Sault Ste. Marie, Ont., increased wages 10 and 12½ per cent July 1 as a result of increased business.

Equipment

Pittsburgh—Carnegie Steel Co. is preparing to ask for bids on dismantling its New Castle, Pa., steel-works. Considerable material which can be reclaimed is being shipped to other subsidiary plants, but a large amount of equipment will be offered for sale. Over this week, when many steel plants will close down for a few days, numerous repairs which have been delayed for some time will be effected.

New York—Machine tool inquiry is heavier. Prices are advancing, lathes 10 to 15 per cent. An eastern transportation repair shop in asking figures on 10 items, including lathes and drills. Delaware, Lackawanna & Western railroad has brought three lathes and a boring mill. A midwestern lathe builder has sold 40 lathes to an Italian automotive factory. The Budd plant in Philadelphia has purchased additional metal fabricating equipment, including a heavy press.

Boston—While operations are still spotty, a substantial number of shops are working close to full-time schedules on fair backlogs. Automatic screw machine builders are generally active and one large order for multiple-spindle screw machines was placed in New England by a Detroit interest this week.

Chicago—Machinery and equipment demand is quieter, sales in some instances showing a sharp drop since a month ago. Machine tool buying is particularly quiet, June having been the slowest of the past several months, with inquiries also light.

Construction and Enterprise

Michigan

BENTON HARBOR, MICH.—Duv Co., manufacturer of lamp shades, has started construction of a new factory building, 60 x 200 feet. Wallace Preston, Benton Harbor, is architect.

CHESANING, MICH.—Peet Packing Co. has under way an expansion and improvement program entailing an expenditure of $75,000, including construction of an electric light and power plant.

DETROIT—Dodge Bros. Corp., 7900 Jos. Campau avenue, is contemplating the construction of a heat treating building.

DETROIT—Chevrolet Motor Co., 3044 West Grand boulevard, has announced plans for extensive expansion of its Saginaw and Bay City parts plants. Considerable new machinery will be installed. M. E. Coyle is president.

GRAND RAPIDS, MICH.—Wolverine Finishing Materials Co., Earl M. Dunbar, president, has acquired Berkey & Gay plant No. 4 for expansion purposes.

GRAND RAPIDS, MICH.—Windsor Furniture Mfg. Co., 1535 Wealthy street, Southeast, has been incorporated to manufacture furniture, by Ralph F. Windoes, 458 Glenwood avenue, Southeast.

KALAMAZOO, MICH.—Billingham & Cobb, architects, are completing plans for a factory building to be erected here for the Murray Co. (Noted April 22.)

KALAMAZOO, MICH. — Kalamazoo Stove Co. is having plans prepared by Leroy & Newlander, architects, for an addition to its plant.

MARSHALL, MICH.—Kleenkoil Co. Inc. has been incorporated to manufacture machines, by Harold C. Brooks, Marshall, Mich.

MUSKEGON, MICH.—Anaconda Wire & Cable Co. has begun a $25,000 improvement program.

Ohio

CLEVELAND—Ohio Bronze Powder Co., G. F. Glass, president, 1120 East 152nd street, is having preliminary plans prepared by Richards & Richards, 22 South St. Clair avenue, Painesville, O., architects, for construction of a factory at Painesville. Estimated cost $35,000.

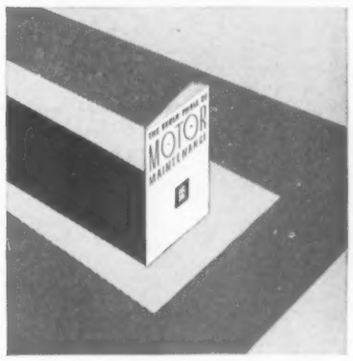
TOLEDO, O.—Libbey, Owens, Ford Glass Co. is planning to install motors, controls, regulators, conveyors and other equipment for expansion at its Ottawa, Ill., glass plant. Cost over $1,000,000, including machinery. (Noted April 15.)

WOOSTER, O.—Cedar Valley Distill-

Rapid

BRUSH WEAR

Can be avoided



If you know the conditions that cause it

Brush wear is extremely variable in that many factors contribute to it. Cleanliness about the machine, load conditions, peripheral speed, pressure, commutator eccentricity are among the many points having a definite bearing on brush life. All conditions of brush operation are treated at length in "The Brush Phase of Motor Maintenance." *Send coupon today for your copy.*

THE OHIO CARBON CO.
12508 BEREA RD., CLEVELAND, O.

THE OHIO CARBON CO.,
12508 Berea Road
Cleveland, Ohio.

Please send free copy of booklet "The Brush Phase of Motor Maintenance."

Name_____

Company_____

Address_____ S-7

ing Co. is contemplating construction of a storage and distribution plant, costing about $40,000. W. G. Lanphear & Sons, 11 Court street, Buffalo, architect and engineer.

Illinois

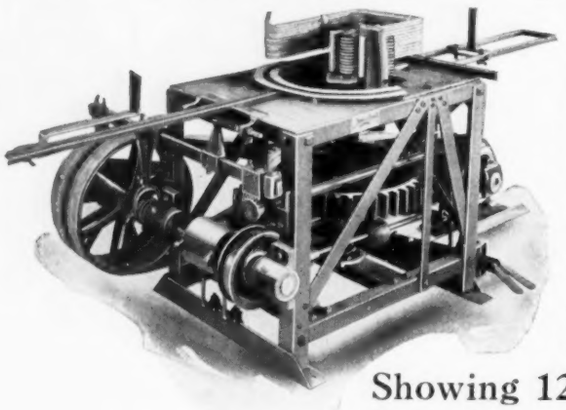
CHICAGO—Ohio Iron & Metal Co., 120 South LaSalle street, has been incorporated to deal in steel, iron and scrap metals, by Benjamin Colitz, Dorothy Carlson and Harold L. Perlman. Correspondent: Schwartz, Welfeld & Perlman, 120 South LaSalle street.

GALENA, ILL.—Galena Distillery Co. has awarded contracts for construction of a 1-story addition to its distillery plant, 40 x 100 feet, and will install aging machinery and other equipment.

ROCK ISLAND, ILL.—Rock Island Mfg. Co., manufacturer of electric appliances, is having plans prepared for a 1-story factory, 110 x 200 feet. Benjamin A. Horn, Central Trust building, is architect.

ROCK ISLAND, ILL.—Plans and specifications have been completed and bids will be taken soon by the United States district engineer's office here for construction of lock No. 13 at Clinton, Iowa, to cost about $2,300,000; lock No. 14 at LeClaire, Iowa, to cost about $2,000,000; lock No. 17 at New Boston, Ill., to cost about $2,000,000; dam No. 18 at Burlington, Iowa, to cost about $3,050,000; dam No. 11 at Dubuque, Iowa, to cost about $3,050,000.

The Kardong Stirrup Bender



This bender is the result of our 20 years experience in the manufacture of reinforcing steel benders. One man can easily turn out four-bend stirrups from ⅜" stock at the rate of 300 or more per hour thus keeping labor costs at a minimum. A Handy bender for small slab bars and miscellaneous bending.

Ask for catalogue of our complete line of reinforcing steel Benders.

Showing 12 ⅜" stirrups bent in one operation

Kardong Brothers, Inc.

Minneapolis, Minn.

For accurate screening of minerals, chemicals and all hard-to-screen materials. Special layouts and sizes to insure maximum production with minimum screening costs.

Wide selection of patterns for modern architectural grilles, panels, radiator covers. Tell us your specifications, and we will submit quotations and samples.

ANY METAL OR PERFORATION

The Harrington & King Perforating Co.

5634 FILLMORE STREET—CHICAGO, ILL.

New York Office, 114 Liberty Street

Indiana

FORT WAYNE, IND.—Joslyn Mfg. Co. is erecting a new plant 84 x 484 feet. A 25-ton electric furnace will be erected in the factory, and a 20-ton crane installed. Cost is estimated at approximately $150,000. William Lowe is superintendent.

WABASH, IND.—Rock City Foundry, recently organized by R. M. Stauffer, president; L. Habitch, vice president, and E. F. Mattern, secretary-treasurer, will lease the Wabash foundry from the North Manchester Foundry Co. for the manufacture of castings.

Minnesota

ALBERT LEA, MINN.—American Gas Machine Co., manufacturer of stoves, heaters, etc., has awarded contract for rebuilding factory recently damaged by tornado.

AUSTIN, MINN.—City council will receive bids until July 2 for construction of a municipal gas distribution system and service lines, to cost about $175,000. Black & Veatch, 4706 Broadway, Kansas City, Mo., are engineers.

ORTONVILLE, MINN.—North Star Granite Co., St. Cloud, Minn., has leased quarry property here and has started construction of an engine house, blacksmith shop and other buildings.

ST. PAUL, MINN.—Western Alloyed Steel Casting Co. has been incorporated to manufacture steel castings, etc., by Edwin F. Jungar, Charles C. Hess and William C. Green.

South Dakota

WESSINGTON SPRINGS, S. DAK.—City council will receive bids until July 2 for an additional diesel unit of approximately 300 horsepower for municipal light and power plant.

Nebraska

COLUMBUS, NEBR.—Loup river public power district, Harold Kramer, secretary, will receive new bids July 3 for construction of a hydroelectric power plant here as part of the $7,300,000 Loup river diversion canal and hydroelectric power project. Former bids on power plant rejected. Plant will contain three vertical shaft generating units.

Pennsylvania

PHILADELPHIA — Tubular Boiler Works, 1925 Germantown avenue, was severely damaged by fire recently.

PHILADELPHIA—Considerable damage by fire was done to the Philco Radio Corp.'s No. 6 plant, Tioga and C streets, June 26.

New York

NEW YORK—Washburn Wire Co. Inc., 550 East 118th street, has filed plans for a $350,000 plant addition. Plans by J. Bart Walther, 103 West 125th street, call for a building 202 x 252 feet. (Noted May 6.)

Connecticut

HARTFORD, CONN.—Wiremold Co., Elmwood, Conn., plans to build two new multi-story additions, one to be used for manufacturing service. Entire project will cost close to $100,000,

(*Please turn to Page* 84)

WHERE-TO-BUY

A classified list of advertisers according to products. ¶ Index to advertisements gives page number of any advertiser.

ABRASIVES (Polishing)
Carborundum Co., The, Niagara Falls, N. Y.
Norton Co., Worcester, Mass.

ACCUMULATORS
Morgan Engineering Co., The, Alliance, O.

ACETYLENE
Air Reduction Sales Co., 60 East 42nd St., New York City.
Linde Air Products Co., 30 E. 42nd St., New York City.

ACID-PROOF LININGS
Ceilcote Co., The, Rockefeller Bldg., Cleveland, O.

ACIDS (Pickling)
American Chemical Paint Co., Ambler, Pa.

AIR COMPRESSORS—See COMPRESSORS (Air)

ALLOYS—See FERROALLOYS

ANGLES, CHANNELS—See BEAMS, CHANNELS, ANGLES

ANGLE IRON BENDERS
Excelsior Tool & Machine Co., Ridge and Jefferson Aves., East St. Louis, Ill.

ANNEALING BOXES
Union Steel Casting Co. 62nd & Butler Sts., Pittsburgh, Pa.

ANODES (All Types)
The Udylite Co., 1615 E. Grand Blvd., Detroit, Mich.

AXLES
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie Steel Co., 327 Carnegie Bldg., Pittsburgh, Pa.
Illinois Steel Co., 208 So. LaSalle St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Youngstown, O.
Standard Steel Works Co., Burnham, Pa.
Tennessee Coal, Iron & Railroad Co., Brown Marx Bldg., Birmingham, Ala.

BABBITT METAL
Cadman, A. W., Mfg. Co., 2816 Smallman St., Pittsburgh, Pa.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.

BANDS—See HOOPS AND BANDS

BANDS (Iron and Steel)
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie Steel Co., 327 Carnegie Bldg., Pittsburgh, Pa.
Illinois Steel Co., 208 So. LaSalle St., Chicago, Ill.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Republic Steel Corp., Youngstown, O.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
The Stanley Works, New Britain, Conn. Bridgeport, Conn.

BAR BENDERS
Kardong Bros., 346 Buchanan St., Minneapolis, Minn.

BARGES (Steel)
American Bridge Co., Frick Bldg., Pittsburgh, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
McClintic-Marshall Corp., Bethlehem, Pa.

BARRELS (Plating)
The Udylite Co., 1615 E. Grand Blvd., Detroit, Mich.

BARRELS (Steel)
Pressed Steel Tank Co., Milwaukee, Wis.

BARS (Alloy)
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie Steel Co., 327 Carnegie Bldg., Pittsburgh, Pa.
Illinois Steel Co., 208 S. LaSalle St., Chicago, Ill.
Midvale Co., The, Nicetown, Philadelphia, Pa.
Republic Steel Corp., Youngstown, O.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Timken Steel & Tube Co., Canton, O.

BARS (Concrete Reinforcing)
Carnegie Steel Co., 327 Carnegie Bldg., Pittsburgh, Pa.
Illinois Steel Co., 208 S. LaSalle St., Chicago, Ill.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Youngstown, O.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown Marx Bldg., Birmingham, Ala.
Youngstown Sheet & Tube Co., Youngstown, O.

BARS (Iron)—See IRON (Bar)

BARS (Steel)
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie Steel Co., 327 Carnegie Bldg., Pittsburgh, Pa.
Illinois Steel Co., 208 S. LaSalle St., Chicago, Ill.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Midvale Co., The, Nicetown, Philadelphia, Pa.
Republic Steel Corp., Youngstown, O.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
The Stanley Works, New Britain, Conn. Bridgeport, Conn.
Tennessee Coal, Iron & Railroad Co., Brown Marx Bldg., Birmingham, Ala.
Timken Roller Bearing Co., The, Canton, O.
Weirton Steel Co., Weirton, W. Va.
Youngstown Sheet & Tube Co., Youngstown, O.

BEAMS, CHANNELS, ANGLES, ETC.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie Steel Co., 327 Carnegie Bldg., Pittsburgh, Pa.
Illinois Steel Co., 208 S. LaSalle St., Chicago, Ill.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Weirton Steel Co., Weirton, W. Va.
Youngstown Sheet & Tube Co., Youngstown, O.

BEARINGS (Ball)
Bantam Ball Bearing Co., The, South Bend, Ind.
Fafnir Bearing Co., New Britain, Conn.
New Departure Mfg. Co., Bristol, Conn.
S K F Industries, Inc., Front St. & Erie Ave., Philadelphia, Pa.

BEARINGS (Bronze)
Cadman, A. W., Mfg. Co., 2816 Smallman St., Pittsburgh, Pa.
Cramp Brass & Iron Foundries Co., Paschall Sta., Philadelphia, Pa.
Shenango-Penn Mold Co., Dover, O.

BEARINGS (Journal)
Bantam Ball Bearing Co., The, South Bend, Ind.
Fafnir Bearing Co., New Britain, Conn.
Hyatt Roller Bearing Co., P. O. Box 476, Newark, N. J.
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.
S K F Industries, Inc., Front St. & Erie Ave., Philadelphia, Pa.
Timken Roller Bearing Co., The, Canton, O.

BEARINGS (Quill)
Bantam Ball Bearing Co., South Bend, Ind.

BEARINGS (Radial)
Bantam Ball Bearing Co., South Bend, Ind.
Fafnir Bearing Co., New Britain, Conn.
Hyatt Roller Bearing Co., P. O. Box 476, Newark, N. J.
New Departure Mfg. Co., Bristol, Conn.
SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa.
Timken Roller Bearing Co., Canton, O.

BEARINGS (Roller)
Bantam Ball Bearing Co., The, South Bend, Ind.
Fafnir Bearing Co., New Britain, Conn.
Hyatt Roller Bearing Co., P. O. Box 476, Newark, N. J.
S K F Industries, Inc., Front St. & Erie Ave., Philadelphia, Pa.
Timken Roller Bearing Co., The, Canton, O.

BEARINGS (Roll Neck)
Bantam Ball Bearing Co., The, South Bend, Ind.
Fafnir Bearing Co., New Britain, Conn.
Hyatt Roller Bearing Co., P. O. Box 476, Newark, N. J.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
S K F Industries, Inc., Front St. & Erie Ave., Philadelphia, Pa.
Timken Roller Bearing Co., Canton, O.

BEARINGS (Roller Tapered)
Bantam Ball Bearing Co., South Bend, Ind.
Timken Roller Bearing Co., Canton, O.

BEARINGS (Rolling Mill)
Bantam Ball Bearing Co., South Bend, Ind.
Cramp Brass & Iron Foundries Co., Paschall Sta., Philadelphia, Pa.
Hyatt Roller Bearing Co., P. O. Box 476, Newark, N. J.
SKF Industries, Inc. Front St. & Erie Ave., Philadelphia, Pa.
Timken Roller Bearing Co., Canton, O.

BEARINGS (Thrust)
Bantam Ball Bearing Co. The, South Bend, Ind.
Fafnir Bearing Co., New Britain, Conn.
S K F Industries, Inc., Front St. & Erie Ave., Philadelphia, Pa.
Timken Roller Bearing Co., The, Canton, O.

BENDING AND STRAIGHTENING MACHINES
Kardong Bros., 346 Buchanan St., Minneapolis, Minn.
Morgan Engineering Co., The, Alliance, O.
Thomas Spacing Machine Co., Pittsburgh, Pa.

BENZOL AND TOLUOL RECOVERY PLANTS
Koppers Construction Co., 1438 Koppers Bldg., Pittsburgh.
Youngstown Sheet & Tube Co., Youngstown, O.

BILLETS (Alloy and Carbon Steel)
Alan Wood Steel Co., Conshohocken, Pa.
Andrews Steel Co., Newport, Ky.
Carnegie Steel Co., 327 Carnegie Bldg., Pittsburgh, Pa.
Illinois Steel Co., 208 S. La Salle St., Chicago, Ill.
Republic Steel Corp., Youngstown, O.
The Stanley Works New Britain, Conn. Bridgeport, Conn.
Timken Steel & Tube Co., Canton, O.
Washburn Wire Co., Phillipsdale, R. I.

BILLETS (Forging)
Alan Wood Steel Co., Conshohocken, Pa.
Andrews Steel Co., Newport, Ky.
Carnegie Steel Co., 327 Carnegie Bldg., Pittsburgh, Pa.
Illinois Steel Co., 208 S. LaSalle St., Chicago, Ill
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Midvale Co., The, Nicetown, Philadelphia, Pa.
Republic Steel Corp., Youngstown, O.
Standard Steel Works Co., Burnham, Pa.
The Stanley Works, New Britain, Conn. Bridgeport, Conn.
Timken Steel & Tube Co., Canton, O.

BILLETS AND BLOOMS
Alan Wood Steel Co., Conshohocken, Pa.
Andrews Steel Co., Newport, Ky.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie Steel Co., 327 Carnegie Bldg., Pittsburgh, Pa.
Illinois Steel Co., 208 S. LaSalle St., Chicago, Ill.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.

(*Concluded from Page* 82)

with equipment. Greenwood & Noerr, Hartford, Conn., consulting engineers.

Massachusetts

BOSTON—Public works officer, navy yard, will issue an early call for bids for extensions and improvements in local yard, including modernization and expansion in electric light and power systems, costing $153,900; improvements in power station and refrigerating plant, $48,600; modernization and improvements in shops and other structures, $491,800. Appropriations have been approved.

New Jersey

NEW BRUNSWICK, N. J.—Parker Pure Rye Co. has acquired the plant of the Cadgene Piece Dye Works and will alter it into a distillery. Estimated cost $100,000.

Alabama

TALLADEGA, ALA.—City, M. R. Joiner, plans waterworks improvements. Estimated cost $60,000.

Maryland

BALTIMORE—Frank L. Wight Distilling Co. has approved plans for a new multi-story building at Loreley, Md., near here. Cost about $100,000, with equipment.

District of Columbia

WASHINGTON—Bureau of supplies and accounts, navy department, will take bids July 9, schedule 5413, chain hoists; schedule 5419 motor-driven engine lathes.

WASHINGTON—Bureau of yards and docks, navy department, will take bids July 10, for a 20-ton locomotive, with clamshell bucket, for navy yard at Charleston, S. C., and 15-ton revolving gantry-type crane.

WASHINGTON — Veterans administration, construction service, room 764, Arlington building, will take bids July 23 for constructing a boiler house addition at veterans administration facility, Bronx, N. Y., and installing boilers and equipment.

WASHINGTON—Bureau of supplies and accounts, navy department, will take bids July 5, schedule 5408, one motor-driven gear shaper machine; schedule 5416, one motor-driven gear shaper machine, schedule 5417, one motor-driven gear shaper machine; schedule 5420, four motor-driven tool room precision lathes, all delivered Philadelphia.

Louisiana

GOOD PINE, LA.—Sawmill, timber docks and dry kilns of Goodpine Lumber Co. recently were severely damaged by fire.

Florida

TALLAHASSEE, FLA.—City, W. R. Gait city manager, will apply to PWA for loan and grant of $250,000 for extending sanitary sewer system.

TALLAHASSEE, FLA. — State of Florida, department of agriculture, is planning to construct a chemical laboratory and offices, east of the state capitol building. Estimated cost $100,000.

North Carolina

CHARLOTTE, N. C.—Hamilton Machinery Co. has been incorporated with $50,000 capital, by Walter Hoyle.

SANFORD, N. C.—City, K. R. Hoyle city atorney, is planning to erect a power plant, costing about $304,000; will apply for PWA funds.

WASHINGTON, N.C. — Fire caused considerable damage to Warners Machine Shop, Mutual Machine Co.'s building, and lumber shed of Moss Planing Mill Co.

Tennessee

CHATTANOOGA, TENN. — Lookout Oil & Refining Co., G. G. Fox president, has under way a $290,000 expansion program, including installation of hydrogen gas producing equipment and new machinery for refining of crude oils.

KNOXVILLE, TENN. — Tennessee Valley Authority will take bids July 9 for machine shop equipment for Wheeler power plant.

West Virginia

PINE GROVE, W. VA.—City, E. S. Earle recorder, will expend $43,000 for waterworks system, including installation of electric pumps. Bernard G. Sampson & Co., engineer, Fairmont, W. Va.

Missouri

KANSAS CITY, MO.—Golden Crown Winery & Distillery Co. has been incorporated with $50,000 capital by Basin Webb, Grandview, Mo., and Arthur Hudson, 504 Scarritt building, Kansas City, Mo.

Arkansas

MAGNOLIA, ARK. — Federal Compress Co. will construct a large cotton warehouse, covering 75,000 square feet of space, and will be equipped with a sprinkler system and other devices.

Wisconsin

ST. LAWRENCE, WIS.— Lawrence Co-operative Distillery Co. plans construction of a distillery, winery, etc. Estimated cost, including equipment, $28,000.

Iowa

ROCK RAPIDS, IOWA—City is considering bond issue of $159,000 for new city-owned electric light and power plant. Department of public utilities, F. W. Gingrich, superintendent, in charge.

Pacific Coast

ALAMEDA, CALIF. — Constructing quartermaster, Benton field, plans installation of transformers and accessories, motors and controls, electric pumping machinery, light and power systems, in connection with extensions and improvements in local field. Program will include new aircraft machine shop and hangars. Appropriation of $2,500,000 is being arranged.

LOS ANGELES—Bureau of power and light has approved plans for new power substation in West Los Angeles. Cost about $70,000, with equipment.

MODESTO, CALIF.—Samuel Sanfilippo and J. H. Defossett are preparing to build a $100,000 winery, to be known as the Stanislaus Winery.

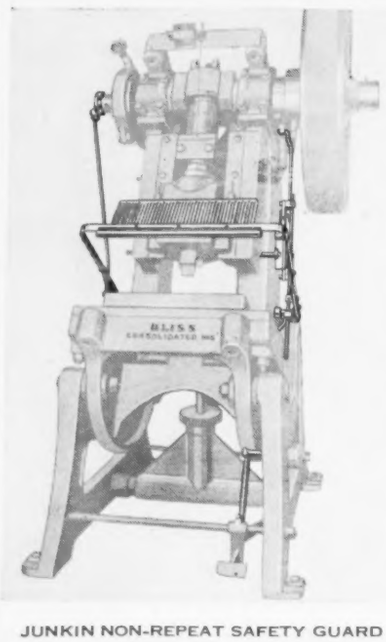
TULARE, CALIF.—Tulare Winery is preparing plans for an addition to its plant, costing approximately $25,000.

PORTLAND, OREG.—United States engineer office receives bids until July 9 for gantry cranes and steel gates for spillway dam and power house, Bonneville project, circular 29.

MT. VERNON, WASH. — Carnation Co. is altering its local plant for the purpose of installing a can factory.

Dominion of Canada

LONDON, ONT.—Superior Charcoal & By-Products Co., Leonard Bartlett president, plans constructing a plant, estimated to cost $50,000.



JUNKIN NON-REPEAT SAFETY GUARD

100% SAFE

- Press ram held absolutely motionless until the Guard is entirely down.
- Press cannot repeat operation unless the guard has dropped.
- Guard cannot injure operator, because it is lightweight and not mechanically driven.
- Operates on any standard press.

Designing a fool-proof safety device for the most dangerous tools in industry called for an ideal beyond mechanical perfection. We have realized that ideal with this device by TRIPLE INTERLOCKING.

With the Junkin Safety Guard on your press, properly adjusted, the human element of guarding the press is entirely removed. Production is increased with SAFETY.

Let us send you full information and a list of present users.

JUNKIN SAFETY APPLIANCE CO.
930-936 WEST HILL STREET
LOUISVILLE, KY.